

ABSTRACT

Title of dissertation: ESSAYS ON FINANCIAL INSTITUTIONS AND
 FIRMS IN CHINA

Jianzhi Zhao, Doctor of Philosophy, 2014

Dissertation directed by: Professor Phillip Lee Swagel
 School of Public Policy

A key factor behind China's spectacular economic growth over the past thirty years has been the transformation from a planned economy to one featuring a booming private sector. This transition is not complete, however, as State-owned enterprises (SOEs) remain extraordinarily powerful in important aspects of Chinese economic activities. While manufacturing is primarily carried out by private firms, for example, China's financial system remains dominated by large government-owned banks and lending activity heavily influenced by non-economic considerations such as government directives to support favored activities. These enterprises tend to invest excessively in poor quality projects that jeopardize their ability to pay back their debt and thus hinder long term growth. Therefore, understanding how China's financial system, especially its banking sector, interacts with the real economy is critical to understanding China's future economic prospects. This dissertation thus will investigate questions pertaining to the interactions between financial institutions and firms in China.

Chapter 1 examines how financial constraints affect investment behavior of Chinese firms depending on the type of firm ownership. How do financial constraints arising from the type of firm ownership influence investment behavior of Chinese manufacturers? Moreover, in the wake of the Chinese government's late 1990s embrace of its "Grasp the Large, Let Go of the Small" policy to focus benefits on large state-owned enterprises (SOEs) at the expense of small ones, how disparate are investment patterns among SOEs? Using a panel of 78,495 Chinese manufacturing firms over the period 2000–2007, SOEs are shown to be significantly much less constrained financially than other types of firms. The heterogeneity of SOE investment behavior and the unequal financial performances of SOEs are also noted. One explanation may be that small SOEs must compete directly with private firms, while large SOEs often enjoy monopoly advantages.

Chapter 2 quantifies the extent to which the easy access to credit enjoyed by certain companies in China affects firm's productivity. The differing access to credit represents a potentially important distortion in China's financial sector, with implications for resource allocation, productivity and thus long-term growth. Past research such as Foster, Haltiwanger, and Syverson (2008) finds that resource misallocation related to firm size affects productivity, and is a key factor in explaining cross-country growth differences. Adapting the methodology of Foster, Haltiwanger, and Syverson (2008) and Olley and Pakes (1996), this paper estimates the extent to which this preferential access to credit enjoyed by SOEs affects productivity growth. The results indicate that SOEs are significantly less likely to have efficient resource allocation than firms not controlled by the various levels of China's government. Industries with dominant state-owned firms (namely, industries with relatively high

market concentration among firms and heavy SOE presence) likewise have less efficiency, suggesting the impact China's SOE policy that has especially favored the largest of the state-owned firms. The results have important policy implications in suggesting that reforms that improve the allocation of credit such as by allowing for greater market forces within the financial system would lead to stronger productivity. Reforms of the SOEs and of the financial system can thus be seen as key measures to ensure continued economic growth in China.

Chapter 3 explores the development of the Chinese financial system and proposes policy recommendations for reforms. The pervasive and significant role of state-owned firms and financial institutions in China is shown chapters 1 and 2 of this dissertation to affect firm investment behavior, and to be associated with inefficient resource allocation in the Chinese economy between 1998 and 2007. However, since the global Great Recession in 2008, Chinese government units at both the central and local levels have invested even more aggressively as a mechanism to boost the economy and maintain job creation—that is, China's government has been even more active in terms of directing credit to specific activities. This activity has been financed in large part by state-owned banks, typically with land as collateral. Meanwhile, financial repression in China leaves families with a limited choice of options for household saving, resulting in a massive diversion of resources into real estate and possibly a real estate bubble. Reforms are needed to provide a foundation for continued strong growth in China, but the ongoing liberalization of the financial system entails risks as well, including to financial and macroeconomic stability.

ESSAYS ON FINANCIAL INSTITUTIONS AND FIRMS IN CHINA

by

Jianzhi Zhao

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2014

Advisory Committee:

Professor Phillip Lee Swagel, Chair

Professor Susan Schwab

Professor Albert “Pete” Kyle

Professor Anton Korinek

Professor Vojislav (Max) Maksimovic

© Copyright by
Jianzhi Zhao
2014

Dedication
To my family.

Acknowledgments

I am extremely grateful to all the people who have made this thesis feasible and interesting.

First and foremost, I owe a debt of extraordinary gratitude to my advisor and coauthor, Professor Phillip Swagel, for his his continuous support, encouragement and intellectual guidance. It is no exaggeration to say he has made “Open Door Policy” to me whether I came to him for research or career questions. The invaluable and numerous conversations we had over the past years have greatly advanced my understanding of how to do important and interesting research. From him, I have learned how an exceptional advisor should be.

I would also like to express my heartfelt gratitude to my committee members and mentors – Susan Schwab, Pete Kyle, Anton Korinek, and Max Maksimovic – for their insightful and thought-provoking comments and conversations. They were always ready to meet when I needed. I am deeply grateful for their patient guidance, constructive suggestions, and continuous encouragement.

I also especially thank Pete Reuter, former Ph.D. director, for bringing me to this excellent program and his guidance during my first year study. Special thanks are also extended to Madiha Afzal and Ioana Petrescu with whom I have taught several semesters and learned a lot teaching skills. I would also like to thank Ph.D. director Anand Patwardhan for his support of my grant and fellowship applications. I am grateful as well to School of Public Policy for providing me with financial support and research friendly environment for my doctoral study, especially Bill Powers and Kenneth Durril. I also thank the fellow PhD students in the School of Public Policy over the past five years.

This dissertation greatly benefited from the data support offered by Ming Lu,

my advisor during Master study. Special thanks are also extended to Siddharth Sharma for his understanding of my time constraints during dissertation writing while working at the World Bank. I would also like to thank Ben, Daisy, Danmo, Eyob, Haishan, Jane, Jiahuan, Junming, Qian, Zamar, and Ying not only for research conversations but also making College Park more “liveable”.

Last but most importantly, words can never express my gratitude to my parents, sister and sister-in-law, and niece for their unconditional love and sacrifice. I would never have accomplished any of this without their never-ending and unwavering support. My deep gratitude also goes to Shiqi for her understanding and support. This thesis is also dedicated to my grandparents to whom I am greatly indebted.

College Park, Maryland

August 13, 2014

Contents

1	Financial Constraints, Firm Investment Behavior and Ownership	1
1.1	Introduction	1
1.2	Background information	6
1.2.1	China’s financial system	6
1.2.2	Financing behavior of firms	8
1.3	Data and summary statistics	12
1.4	Empirical strategy	26
1.4.1	Specification and regression results	26
1.4.2	Heterogeneity of SOEs: Evaluating the impact of the “Grasp the Large, Let Go of the Small” policy	33
1.5	Conclusions	45

2	Misallocation, Ownership, Financial Constraints	47
2.1	Introduction	47
2.2	Background information and data description	54
2.2.1	Background introduction	54
2.2.2	Data description	58
2.3	Empirical strategy	74
2.3.1	Firm level evidence	74
2.3.2	Within-industry evidence	77
2.4	Conclusions	82
3	Financial Reform in China	84
3.1	Introduction	84
3.2	Background information and history	88
3.3	Recent development	96
3.4	The challenge and proposal of financial sector reform .	107
3.5	Conclusions	114

List of Figures

1.1	The Median Average of Investment over Capital Stock	19
1.2	The Median Average of Investment over Profit	20
1.3	The Median Average of Investment over Cash Flow	20
1.4	The Median Average of Debt over Assets	21
1.5	The Median Average of Interest Payment over Total Costs	22
1.6	The Median Average of Real Interest Rate	22
1.7	The Median Average of Profit per employee	24
1.8	The Median Average of Net Profit Ratio	24
1.9	The Median Average of Return on Equity	25
1.10	The Median Average of Total Factor Productivity	25
2.1	Firm Distribution Across Provinces in China	62
2.2	Distribution of SOE Share Across Province in China	62
2.3	Regional Comparison of S.D. in Profit Labor Productivity in China	67
2.4	Regional Comparison of S.D. in TFP in China	67
2.5	S.D. in Profit Labor Productivity among Industries over Years	70
2.6	S.D. in TFP among Industries over Years	71

2.7	OP Covariance among Industries over Years	71
2.8	Cross Country Comparison on S.D. in TFP	73
2.9	S.D. in Profit Labor Productivity among Industries by Ownership . .	75
2.10	S.D. in TFP among Industries by Ownership	75
2.11	OP covariance among Industries by Ownership	76
3.1	Bank Assets and Growth Rates from 2004 to 2013	94
3.2	State-owned Bank Assets and Growth Rates	98
3.3	Market Share by Assets for Various Categories of Banks	99
3.4	Non-performing Loans for Different Types of Banks	101
3.5	The Development of Trust Funds Share in Financial Sector	102
3.6	The Comparison of Returns to Different Investment Products	104
3.7	The Development MMF by Internet Finance	106

List of Tables

1.1	Distribution of Observations by Ownership Category	14
1.2	Ownership and Summary Statistics of Main Variables	16
1.3	Firm Investment, Financial Constraints and Interaction with Ownership	31
1.4	Ownership and Percentile Distribution of Sales and Total Assets . . .	36
1.5	Firm Investment and Financial Constraint for Subgroup	38
1.6	Firm Investment and Financial Constraint for Subgroup	39
1.7	Firm Investment and Financial Constraint for Subgroup	42
1.8	Firm Investment and Financial Constraint for Subgroup	44
2.1	Distribution of Observations by Ownership Category	60
2.2	Olley-Pakes Allocative Efficiency and Firm Ownership	78
2.3	Allocative Efficiency by With-in Industry S.D. and Firm Ownership .	81

Chapter 1

Financial Constraints, Firm Investment Behavior and Ownership

1.1 Introduction

China has undergone spectacular economic growth over the past thirty years. Its booming private sector has shouldered much of the burden of the transformation from a rigid planned economy to a somewhat market-oriented economy, including the task of reallocating labor and capital across manufacturing firms to achieve huge productivity gains (Song, Storesletten, and Zilibotti, 2011). Even so, China's financial system remains relatively backward. It is dominated by state-owned players, including five massive state-owned banks.¹ Due to political incentives and moral haz-

¹Each of China's five largest state-owned banks originally had distinct missions. Industrial and Commercial Bank of China was tasked with lending to state industrial enterprises. China Construction Bank specialized in financing infrastructure projects and fixed capital assets. The Bank of China concentrated on financing of trade and international activities. China Agriculture Bank, which had the most extensive branch network, was involved with rural and agriculture-related lending. The Bank of Communication provided money for transportation and

ard, among other things, state-owned banks prefer to channel loans to state-owned enterprises (SOEs) or investment vehicles created by local governments, even if the outcome is low to zero profit, or even default of the debtor. Thus, understanding how China’s financial system, especially its banking sector, interacts with the real economy should provide insights into past and future economic growth. To explore the link between financial system and firms we ask two related questions. First, how do financial constraints arising from the type of firm ownership influence investment behavior? Second, how has the government’s “Grasp the Large, Let Go of the Small” policy of SOE reform affected corporate investment behavior?

There is an extensive body of literature that considers how financial system development (includes financial markets and intermediaries) is linked to economic development. Three strands of studies on institutions, investment behavior of firms, and firm growth have emerged in financial economics in recent years. The first strand consists of research into whether a robust legal system that secures property rights enhances financial system outcomes and thereby leads to higher economic growth (Porta, Lopez de Silanes, Shleifer, and Vishny, 1998, 2000; Knack and Keefer, 1995; Mauro, 1995; Svensson (1998); Acemoglu, Johnson, and Robinson, 2012). The second strand of literature investigates the correlation and causality relationship of financial sector development and economic growth (Levine, 1997; Rajan and Zingales, 1998; Levine, Loayza, and Beck, 2000). This strand includes cross-country analysis of industry-level data Rajan and Zingales (1998) that widely suggests that a more evolved financial system fosters higher firm growth and thereby economic growth by reducing external financing costs of firms. The third strand investigates the im-

communication ventures. These five huge banks are owned by the central government under the auspices of the Treasury Department within the Ministry of Finance. See Cousin (2007) for detailed information.

plications of the first two strands in combination. Demirgüç-Kunt and Maksimovic (1998) find that the legal system and financial markets are positively associated with a firm's access to external finance and its prospects for long-term growth.

China confounds the consensus take-away from these studies. Its financial system reforms came long after other major reforms. For example, land reform was underway already in 1978. Labor market reform had established a fairly flexible labor market by the late 1990s. Banking sector reform, in contrast, did not get going until the early 2000s with the IPOs of four big state banks. Even today, the Chinese financial system is far from market-oriented. The big banks are still largely state-owned. Interest rates have yet to be deregulated and thus do not provide a signal for capital allocation. The bulk of lending still goes to state-owned companies or government-related investment vehicles.

Nevertheless, privately owned firms in China have thrived despite their lack of access to formal credit markets. Several papers examine how Chinese private firms finance their investments. Allen, Qian, and Qian (2005), for example, associate the higher growth of the private sector relative to the rest of the economy, as well as its disproportionately large contribution to economic growth, with effective alternative financing channels and corporate governance mechanisms based on reputation and relationships. After grouping firms based on their ownership, Guariglia, Liu, and Song (2011) find that the higher growth of the Chinese private sector reflects higher profitability that permits investing of retained profits. In such case, sophisticated external financial markets are not necessarily a prerequisite for firm growth. Similarly, after distinguishing the effect of institutions from external finance, Cull and Xu (2005) note that expropriation risk and contract enforcement play a more important

roles in the investment decisions of Chinese firms than access to external finance. Indeed, private firms are more likely to reinvest their profits than SOEs because their property rights are more secure. Moreover, access to finance and government expropriation are issues more likely to affect small firms than large ones. Ayyagari, Demirgüç-Kunt, and Maksimovic (2010) challenge the view that the booming Chinese private sector firms is evidence that informal finance facilitates firm growth better than a formal banking in developing countries. After examining firm financing patterns and growth of 2,400 Chinese firms, they find that firms with access to bank financing grow faster than similarly situated firms lacking access to bank financing (even after controlling for bank corruption and how firms gain access to formal external finance). In their view, reputation and relationship-based informal financing do not fully explain the performance of the fastest-growing firms in developing countries and a strong formal financial system is still irreplaceable. Notably, these studies are based on either a relatively small number of observations or cross-sectional data set, or they only investigate growth of total assets. Moreover, few of these studies consider differences in performance of state-owned companies, particularly those that enjoy monopolies and those that must compete with the private sector.

This study contributes to the literature in three ways. First, we draw on a large data set for China's most important sector, the manufacturing sector. It covers over one million observations from 1998 to 2007. Most data sets in the literature are much smaller. The total output of our sample represents approximately 90% of gross output in Chinese manufacturing sector. Moreover, this data set is unique in its richness of diversified ownership. It includes most state-owned companies, many private domestic firms, as well as a number of foreign-owned companies.

The second contribution comes from our detailed look into how ownership interacts with financial constraints to determine a firm’s investment behavior. Examining 1,300 firms from 18 Chinese cities using a Euler equation framework, Héricourt and Poncet (2009) find that domestic private firms are more financially constrained than SOEs. This suggests that cash flow plays an important role in determining firm investment and firm growth. Guariglia, Liu, and Song (2011) look at differences in financial constraints of SOEs and private firms by measuring asset growth and cash flow. They find SOEs have weaker and less significant cash flow and assets growth compared to private domestic and foreign-owned manufacturing firms, indicating SOEs are less constrained financially as they enjoy ready access to external financing. However, asset growth is such a vast and noisy concept that any conclusions would have to include large caveats.

Perhaps the most valuable contribution here is our attempt to shine a light on the heterogeneous financial performances of SOEs. China’s central government adopted a strategic policy in the late 1990s to reform SOEs. The so-called “Grasp the Large, Let Go of the Small” policy, despite its profound significance, has seldom been evaluated on the basis of micro-evidence. At one end of the spectrum, we have huge SOEs with massive revenue streams and exceptional profitability due to their monopoly status within select industries. At the other end, we have small and mid-sized enterprises (SMEs), especially those originally owned by local governments, that now must compete with private domestic firms even if they may have policy and financial support from their affiliated government. This work is among the front-runners in exploring differences between these two groups of SOEs in terms of financial performance, financial constraints, and investment behavior.

The structure of the remainder of the paper is as follows. Section 1.2 briefly reviews the background information on China’s financial system and firm’s financing behavior. Section 1.3 provides a description of the data and summary statistics. Section 1.4 undertakes an empirical study of how financial constraints interact with firm’s ownership to determine their investment behavior. In Section 1.5, we group the data by top and low percentile of each category and attempt to investigate the implication of “Graph the Big and Let Go of the Small”, the major SOE reform in the late 1990s. Section 1.6 provides some concluding remarks.

1.2 Background information

1.2.1 China’s financial system

Despite China’s high economic growth over the past three decades, the relative backwardness of its formal financial system remains notable. The formal financial system consists of financial intermediaries that are mainly state players of relatively small-scale financial markets. The main financial intermediary is the banking sector. It is the primary financing source for firm investment, particularly state-owned firms and certain large private firms. China also has an informal financial system, sometimes referred to as the shadow or nonstandard financial sector, e.g. Allen, Qian, Zhang, and Zhao (2012). Informal financing arrangements have boomed in recent decades. Operating outside the legal system and away from government supervision, the sector is widely seen as the primary source of funds for small private companies and private start-ups.

Like other East Asian transition economies, Chinese households have high savings rates. For example, Allen, Qian, Zhang, and Zhao (2012) find that Chinese bank credit ratios and household savings during 1991–2009 are similar to those of South Korea during the 1970s and 1980s. However, due in part to the stunted development of China’s financial sector, most household savings must be held in banks. The banking sector is the key component of China’s financial system. It plays a considerably larger role in the Chinese economy than, say, banks in the US financial system. A big reason is that the Chinese banking sector provides most financing, both indirect and through debt issues, for Chinese firms.² At the same time, a cluster of state-owned players dominates the Chinese banking sector. Following the IPOs of the biggest Chinese banks, the total assets of the five largest state-owned banks in 2006 represented about 90 % of total banking sector assets. That share declined to about 45 % of total assets by 2012, but still represented total assets of RMB 57.9 trillion. Joint equity banks, the second largest category of banks, saw their total assets reach assets RMB 23.4 trillion at the end of 2012, which corresponded to 17.9 % of total banking assets.³ Non-listed city-government-owned banks held assets of RMB 11.4 trillion at the end of 2012. Their total assets have been growing roughly twice as fast as those of banks in the other two categories. Even with the rise of the smaller regional institutions, both government and private, the biggest Chinese banks are large by global standards and control a disproportionate share of the banking sector.

China’s informal financial system consists largely of private money houses, pawn-

²This contrasts with the US financial system, where bond markets and non-bank lending channels such as securitization also play significant roles. The total assets of all banks in China exceed US bank assets, both as a percentage of GDP and in absolute terms. At the end of 2012, Chinese banks held total assets in excess of \$20 trillion, an amount comparable to about three times GDP. The total assets of US banks, \$13 trillion, roughly equaled GDP.

³Most joint equity banks are publicly listed on the Hong Kong Stock Exchange or on domestic exchanges. Unlike the five big state-owned banks, which are controlled by the central government, the largest shareholders of joint equity banks are typically provincial governments.

brokers, and money lenders. Despite being proscribed from engaging in financial transactions by the People's Bank of China and China Banking Regulation Commission, business has boomed in recent decades, especially in coastal areas, the countryside, and at the village level. Due to the lack of both micro-level and macro-level data on informal financial sector, it is hard to estimate the size of the informal financial system. Rough estimates in late 2003 ranged between RMB 740 billion to RMB 3 trillion. Since then, the sector has undoubtedly grown as informal financing channels are crucial where formal financing fails to meet credit demand. In Wenzhou City, the private sector generated over 98 % of GDP, yet over 80% of private firms, especially small and start-up firms, had to depend on informal financing.⁴ Informal lending is mainly based on traditional informal institutions such as social norms, mutual trust, and *Guanxi* (social networks). Porta, Lopez-De-Silanes, Shleifer, and Vishny (1996) find that China has one of the highest levels of social trust among a group of 40 developed and developing countries. This may partly explain why the informal financial system functions so well and readily overcomes barriers to private provision of financial services.

1.2.2 Financing behavior of firms

The Chinese experience of recent decades defies the consensus view that rudimentary financial markets limit a firm's investment possibilities and thus hinder economic growth. A huge number of firms have experienced high growth despite China's relatively undeveloped financial system. Disentangling the correlation between financing

⁴Data source: Nationwide Survey on Informal Finance by Central Finance University of China.

behavior and the financial system may help us understand this puzzle.

Despite advances in China's equity and bond markets, their roles in financing corporate investment remains limited due to heavy regulation and systemic inefficiencies. The banking sector remains the most important source of financing. In 2012, financing provided in the form of bank loans totaled RMB 8.2 trillion. In comparison, bond financing amounted to RMB 2.2 trillion and equity financing . Since the banking sector is dominated by government-owned players at the central and local levels, most bank lending goes to SOEs or big firms with strong connections to government. The main reasons for this are political incentives and information problems.

Political incentives encourage the biased flow of banking funds to SOEs rather than their more productive private counterparts. While the connection between SOEs and state-owned banks has eroded since reforms in late 1990s and early 2000s, government at central and local levels can still implicitly commit to economic stability and growth targets. The state's massive stimulus program during 2008–2010, for example, was geared to sustaining economic stability, with the result that state-owned banks aggressively poured money into government-funded projects and SOEs. Political incentives are also reflected in the governance of state-owned banks. The CEOs of five biggest state-owned banks are all members of Central Committee and administratively hold positions on par with deputy ministers. As Dobson and Kashyap (2006) pointed out, “If the Chinese government wishes to retain majority ownership at this stage of the financial system's development, its expectation that the Big Five banks will behave like commercial banks is likely to be disappointed.”

Information problems are major drivers in causing banks to prefer SOEs and big

firms over small and medium-sized domestic firms. Hoshi, Kashyap, and Scharfstein (1991) find that bigger firms and conglomerates are more likely to get loans in Japanese credit market due to imperfect information since they are more easy to monitor and thus reduce the information problem for banks. If anything, the situation in Chinese credit markets is even more opaque as fixed asset such as land or buildings are the most acceptable collateral for bank. Chinese bankers are also put off by the high costs of monitoring a firm's operation and heavily rely instead on courts and governments to seize collateral and ensure loan repayments. The higher monitoring and transaction costs exacerbate the reluctance of banks to lend to SMEs. Moreover, loan repayment from SOEs and large private firms is implicitly guaranteed by the government. This leaves private SMEs to seek alternative ways to finance their investments.

The informal financial system is one way to fill this gap. A study of 17 surveyed firms by Allen, Qian, and Qian (2005) found that over 60 % of investment funding was raise via informal financing channels. However, Ayyagari, Demirgüç-Kunt, and Maksimovic (2010) argues that the role of reputation and relationship-based informal financing is likely to be limited and unlikely to substitute for formal financing channels. While the size and extent to which informal financing is debatable, it clearly plays an important role during the start-up period for private companies and in regions where formal finance channels are limited. A 2012 report by the People's Bank of China looking at Wenzhou city found that 90 of 105 firms surveyed financed their investments through private borrowing. Over 30 % of respondent firms said that informal financing was the only realistic external source for financing their investments. Informal lenders provided easy access to credit and imposed no requirement

that collateral be in the form of fixed assets.⁵

The informal lending system emphasizes personal relationships, reputation, and trust. It mitigates the asymmetric problem faced by banks when they attempt to deal with small and medium-sized firms (SMEs). While informal financial system exists outside the protection of the legal system, governments also refrain from getting involved in private transactions. The enforcement of informal financing contracts is not governed, however, by the Guarantee Law, and thus not protected by the legal system or government administrations. On the other hand, SOEs generally are not allowed to borrow from informal lenders. This is not just a matter of legitimacy; the official expectation is that SOEs enjoys preferred access to the banking system and capital markets. Thus, the main players in informal financial system are private start-ups and SMEs.

Self-financing or internal financing, mainly through retained earnings, is another important channel for Chinese firms, especially for private domestic firms. Ayyagari, Demirgüç-Kunt, and Maksimovic (2010) note that the percentage of internal financing to total investment is negatively correlated with corporate size for Chinese firms. Since private domestic firms are usually smaller than SOEs, they are less likely to have access to external financing channels and must finance their investments through retained earnings. Song, Storesletten, and Zilibotti (2011) argue that a big reason for China's astonishing growth is precisely the reallocation of capital from less productive businesses with easy access to external financing to high-productivity firms operated by agents with entrepreneurial skills but poor access to external finance. These companies have been forced to use retained earnings to grow their businesses.

⁵Please refer to National Administrative Academy Report, No. 5, 2012.

This theory also explains the extraordinarily high savings rates of Chinese firms, even compared to other developing countries. Heavy reliance on out-of-pocket financing could well indicate poor external financial opportunities for productive SMEs.

1.3 Data and summary statistics

Our data are taken from firm-level data sets of the Annual Census of Enterprises from 1998 to 2007 conducted by the National Bureau of Statistics. They include all state-owned enterprises (SOEs) and non-SOEs with annual sales over RMB 5 million (around \$600,000). In 2007, the sample covered over 350,223 firms in cross-section.⁶ The data contain all information on the firm’s basic characteristics and three accounting statements (balance sheet, income statement, and cash flow). These, in turn, include around 130 variables related to firm characteristics and financial variables for each firm. Basic characteristics include ownership format, location, number of employee, and industry. The firms are largely involved in manufacturing, which is the main activity of 90 % of all firms in China.⁷

Table 1.1 shows the ownership distribution and year of observation in our sample.

⁶The exchange rate used here is US\$ 1 = RMB 8.0. The Chinese currency was basically pegged the dollar during our observation period, 1998–2007.

⁷This data set is the most comprehensive data available on Chinese firm level research. However, some problems related to this research emerged. The first problem is the mismatch between firm-year observations. In another word, some firms are shown with different firm ID even among different cross-sections. To address this issue, we mainly follow the method by Brandt, Van Biesebroeck, and Zhang (2012) to match information based on firm code, firm name, and other firm characteristics. Another issue is the change in the industry code. However, we find the two digit industry code don’t change over the sample period and thus we use it as the main analysis in the following thesis. Moreover, between 1999 to 2003, the information for variable “value added” is missing. Therefore, we manually calculate it by value added=total output-total intermediate input+value added tax, which is defined by the accounting standard provide by China Bureau of Statistics. To verify this method, we compare the value calculated by this equation to the values reported for observations after 2003 and find the two are almost the same, indicating our estimation is a reliable approach. Last but not the least, some observations report the inaccurate value or apparent outliers. We drop firms with obvious errors such as firm annual sales less than five Million RMB. Also, we tried to drop the top and low 0.5% observations according to the main variables that have significant inconsistency and find the patters are generally the same. The results are available upon request.

The share of SOEs steadily declines over the period 1998–2007. The number of SOEs is three times greater than private domestic companies in 1998 but only one-twelfth the amount by 2007. The change reflects the fact that this data set only includes firms with annual revenues in excess of RMB 5 million. Private domestic companies are still relatively small in 1998, but the share of private domestic firms rises dramatically from 0.85 % in 1998 to 10.76 in 2007. Part of this increase comes with an extensive 2005 survey that identifies many private firms with annual revenues over RMB 5 million. The picture for collective firms is similar to SOEs; their share declines steadily from 1998 to 2007. Collective firms played an important role 1980s and early 1990s before restrictions on private ownership were relaxed. With ongoing privatization and competition from private firms and SOEs, collective firms steadily lose ground. Many are privatized or go bankrupt. China’s WTO accession in late 2001 gives local governments strong motivation to attract FDI. Thus, we see the share of foreign companies in the total sample rise dramatically. The share of firms with owners from Hong Kong, Macau, and Taiwan (HMT) only rises twice from 1998 to 2007, exhibiting milder growth than any other ownership formats. It may be that investors from these areas were among the first foreign investors to invest in China. HMT investors moved earlier, mostly in the 1980s and 1990s while other foreign companies were still reluctant to invest in China due to uncertainty, especially political risk. After 2000, when other international firms start to enter China on a large scale, the number of investors from HMT remains relatively stable. While the share of HMT firms are almost two times greater than foreign firms in 1998, the HMT number is smaller than for foreign firms by 2007.

Table 1.1: Distribution of Observations by Ownership Category

Year	SOE	Domestic	Collective	Foreign	HMT	Total
1998	2.61	0.85	2.36	0.49	0.71	7.02
1999	2.41	1.13	2.23	0.51	0.72	7.00
2000	2.04	1.58	2.08	0.56	0.75	7.01
2001	1.69	2.56	1.86	0.62	0.85	7.59
2002	1.49	3.33	1.70	0.71	0.92	8.14
2003	1.20	4.38	1.48	0.83	1.00	8.90
2004	1.20	7.52	1.25	1.38	1.34	12.68
2005	0.88	7.75	1.10	1.38	1.30	12.41
2006	0.77	9.17	0.97	1.52	1.38	13.81
2007	0.56	10.76	0.90	1.70	1.52	15.44
Total	14.85	49.02	15.93	9.69	10.5	100

Notes: (1) All numbers are in percentiles.

(2) HMT indicates Hong Kong, Macau and Taiwan.

As our main goal is to test for variations in investment at different debt levels and differences in financial performance depending on the form of ownership, we focus on three measures: investment, indebtedness and firm performance. Table 1.2 summarizes these three variable groups by ownership category. We find the weighted mean average and medium average of investment to capital stock for SOEs noticeably smaller than in any other ownership category. SOEs tend to have higher capital stock and earlier founding dates, so most have passed through their most intense growth by our observation period. In contrast, private domestic firms out-invest all other firm types in the observation period. They grow dramatically, which may also explain why their relative share in the sample rises fastest in Table 1.1. Collective, HMT, and foreign firms invest about the same percentage of their capital stock and grow at similar rates. For another investment measurement, the ratio of investment in period t to profit in period $t - 1$, both its mean and medium of SOEs

are significantly higher any other type of firms. This is probably because SOEs, despite lower profitability, still reinvest more of their profits than other types of firms. This may also reflect the easier access of SOEs to external financing channels. Private domestic firms rank second, although the difference from collective, HMT and foreign ownership is unremarkable. Interestingly, the difference in the medium of I_t/P_{t-1} among all patterns of firms are not significantly as a mean value, especially for SOEs. This suggests that SOE investment is more unevenly distributed than for other firms. When we substitute the profit variable for cash flow (profit plus depreciation), however, the absolute value of $I_t/Cash\ Flow_{t-1}$ for all types of firms decreases significantly and the differences among them are insignificant. This finding may simply indicate that Chinese firms deliberately accelerate depreciation rates to reduce profits in order to evade capital gains taxes.

Part B of Table 1.2 tabulates the summary statistics for debt measurement variables. The debt ratio of SOEs are higher than for other types of firms, indicating SOEs have higher leverage and prefer debt financing. The same holds for the ratio of interest payment to total costs; SOEs have higher interest payments than other firm types. Interestingly, HMT and foreign companies pay a smaller share of interest fees to total cost than Chinese firms, despite nearly identical debt ratios. Apparently, the real interest rates they pay for debt financing are lower than those available to private domestic and collective firms, but higher than for SOEs. As might be expected, the real interest rates for private domestic firms are the highest among all firms. SOEs enjoy the lowest real interest payments. For medium values, however,

Table 1.2: Ownership and Summary Statistics of Main Variables

Variables	SOE	Collective	Private	HMT	Foreign
Part A: Investment Variables					
I_t/K_{t-1}	0.29 (0.11)	0.53 (0.19)	0.62 (0.25)	0.51 (0.20)	0.51 (0.20)
I_t/P_{t-1}	4.75 (0.89)	2.64 (0.54)	3.01 (0.75)	2.57 (0.57)	2.07 (0.44)
$I_t/Cash\ Flow_{t-1}$	1.00 (0.54)	0.84 (0.39)	1.04 (0.50)	0.78 (0.41)	0.73 (0.36)
Part B: Debt Measurement Variables					
$Debt_t/Asset_t$	62.43 (63.34)	57.26 (58.65)	58.57 (60.28)	54.84 (54.37)	53.27 (53.91)
$Interest_t/Cost_t$	3.87 (2.76)	2.53 (1.99)	2.46 (1.87)	1.84 (1.53)	1.79 (1.46)
$Interest\ rate$	2.35 (2.10)	4.78 (2.78)	4.93 (3.98)	3.35 (2.78)	3.39 (2.54)
Part C: Firm Performance Variables					
$Profit\ per\ emp.$	25.19 (2.37)	30.80 (9.92)	23.64 (8.69)	26.85 (8.16)	44.53 (13.12)
$Profit_t/Revenue_t$	0.02 (0.02)	0.05 (0.04)	0.05 (0.03)	0.05 (0.03)	0.05 (0.04)
$Return\ on\ Equity$ (ROE)	8.16 (4.67)	23.83 (13.58)	26.28 (14.19)	17.72 (10.32)	18.64 (12.31)
$Ln(TFP)$	-0.39 (-0.37)	-0.08 (-0.12)	0.07 (0.06)	0.01 (-0.01)	0.14 (0.12)

Notes: The first row and second row for each variable-category cell are weighted mean average and median average (in parentheses), respectively. Debt/assets, return on equity and interest rates are in percentage term with the rest of variables in ratio. Profit per employee is in thousand RMB. All variables were deflated using provincial ex-factory PPI (producer price indices) from National Statistical Bureau. Variables, interest rate variable and Return on Equity are in percentile.

the magnitude of difference is smaller for SOEs, as well as HMT and foreign firms.

Part C of Table 1.2 reports the summary statistics on firm performance variables. The mean average profit per employee is almost the same for collective, private domestic, and HMT firms as it is for SOEs. Foreign firms have the highest profit per employee, indicating they are the most profitable and probably the most productive manufacturing firms. Interestingly, the median average of SOEs declines dramatically to 2.37, indicating SOE profitability varies considerably. Foreign companies generate the highest profit per employee, around 50 % more than collective, private domestic, or HMT firms. For profit margin, the mean average of SOEs is less than half that of other firms. For the median average is the same in the case of SOEs. The scenario is mostly the same with return on equity. SOEs generate the smallest return on equity; less than a third that of domestic private firms. The mean average of return on equity of foreign firms is moderately smaller than for private domestic and collective firms, and almost the same for HMT firms. The median average is almost the same except that the gap between foreign and HMT firms narrows with private domestic and collective firms. Overall, SOEs are significantly less profitable than other types of firms.

We also consider the natural logarithm of total factor productivity (TFP), a common measure of technological advancement. Following the definition of Foster, Haltiwanger, and Syverson (2008), we obtain TFP as a regression residual of firm-level production function regression:

$$\ln TFP = \ln Y_{i,t} - \hat{\alpha} \ln K_{i,t} - \hat{\beta} \ln L_{i,t},$$

where $Y_{i,t}$, $K_{i,t}$ and $L_{i,t}$ is the real value added, real capital input, and employment of firm i in period t , and $\hat{\alpha}$ and $\hat{\beta}$ denote the estimates of regression coefficients for capital and labor inputs.⁸ Part C of Table 1.2 shows SOEs have significantly lower TFP than other types of firms. Domestic firms have the second-highest TFP after foreign firms. By the same token, private domestic firms in 2008 accounted for 65 % of national patent activity and 80 % of new products.⁹ Measurement error also may play a role; most SOEs operate in capital-intensive branches where technological advances are incorporated to a certain extent into the capital stock. The TFP of foreign firms is the highest, double that of domestic private firms. This is consistent with the findings of many studies that suggest foreign firms provide a technology dispersion effect for domestic firms.

We extend our research to investigate the median average year trend of these different patterns of firms.¹⁰ Figure 1.1 indicates the median investment to capital stock of SOEs starts out much lower than for the rest, but gradually catches up as 2007 approaches. Private domestic firms maintain the highest investment pace. In 2006, when a series of unusually strict macroeconomic measures were adopted to cool the economy, private domestic, collective, HMT, and foreign firms all experienced significant drops in investment. SOEs, in contrast, continued to invest at a relatively stable pace even as the central bank tightened its stance.¹¹ This adds to the evidence

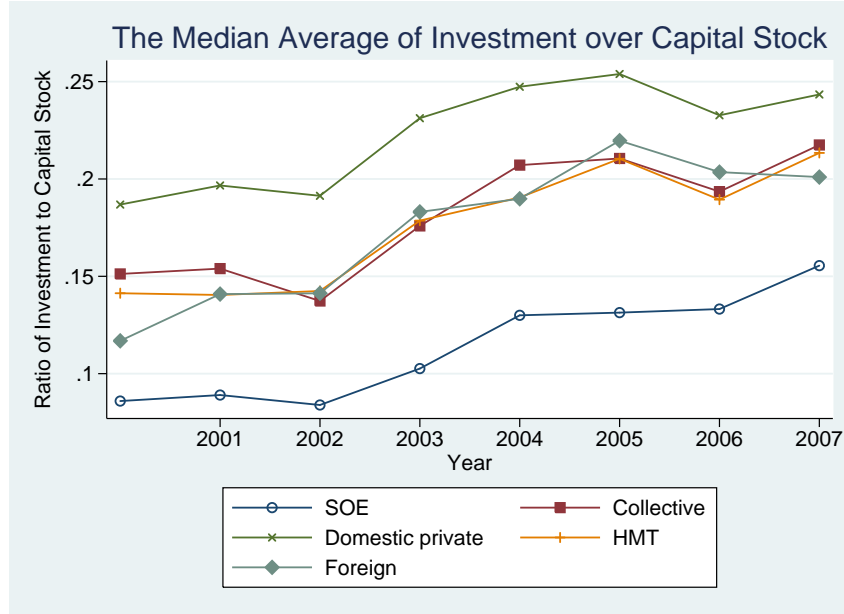
⁸Following Foster, Haltiwanger, and Syverson (2008) and Melitz and Polanec (2012), we include two-digit industry dummies and year dummies in our production function regressions. Though Petrin and Levinsohn (2012) pointed out the advantage of value-added production function over gross output production function as the former method yields a much more direct welfare interpretation, we still examine gross output in the production function to calculate TFP and find the pattern robust to this alternative measure for different firm ownership. Detailed results are available upon request.

⁹Data source: China National Bureau of Statistics.

¹⁰We also graphed the mean average for all these variables, but they have been omitted for space reasons. In any case, the average year trend remains consistent with median average. This material is available on request.

¹¹The required reserve rate, a frequently used monetary tool of the People's Bank of China, was raised three times from 7.5 % to 9 % in 2006 and to 9.5 % in January 2007.

Figure 1.1: The Median Average of Investment over Capital Stock



that SOEs face fewer financial constraints and can finance their investments even when the market faces a credit crunch. The means of investment over profit and cash flow (Figure 1.2 and Figure 1.3) are quite similar, with SOEs and domestic private firms significantly higher than the rest.

Figure 1.4 and Figure 1.5 present the annual trend of debt ratio and the percentage of interest payment to total costs. SOEs are consistently the most leveraged, even if leverage decreases over time for all types of firms. HMT and foreign firms constantly

Figure 1.2: The Median Average of Investment over Profit

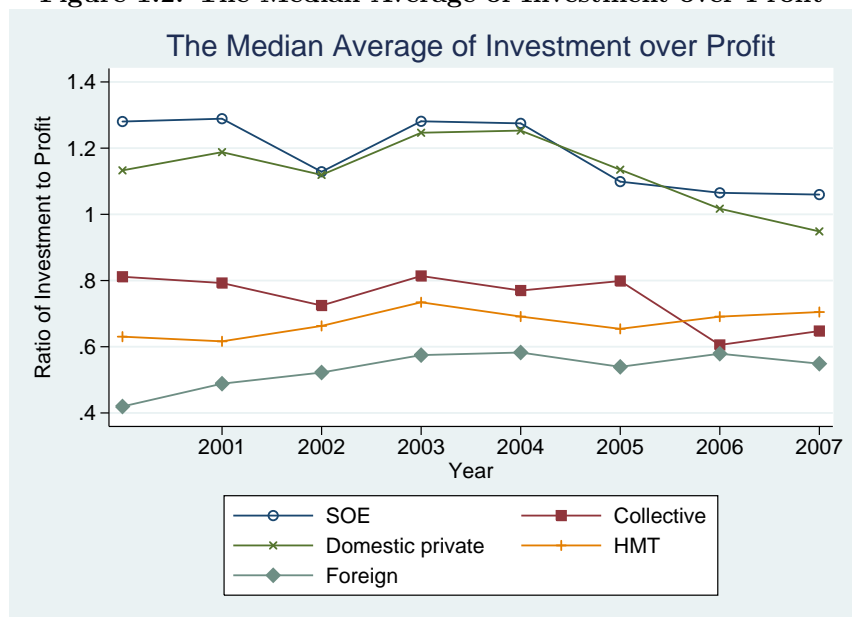


Figure 1.3: The Median Average of Investment over Cash Flow

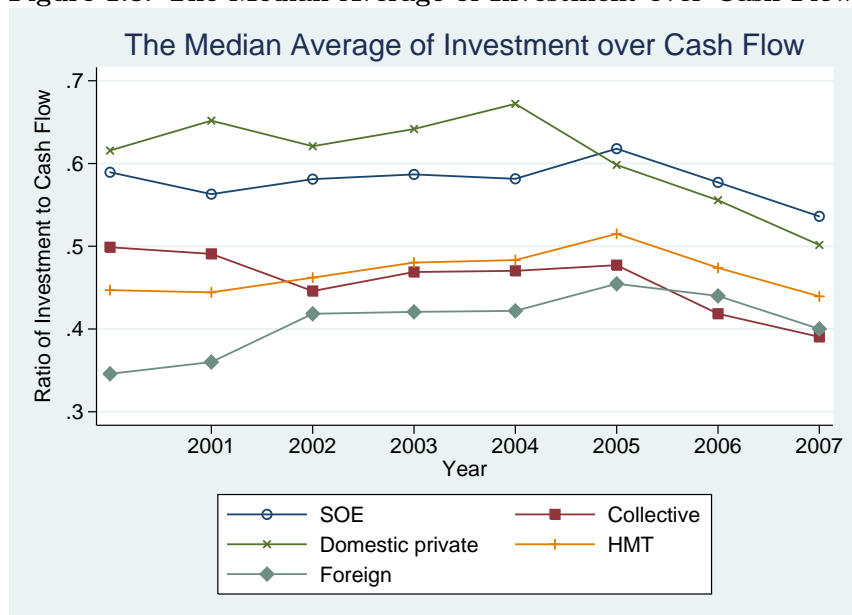
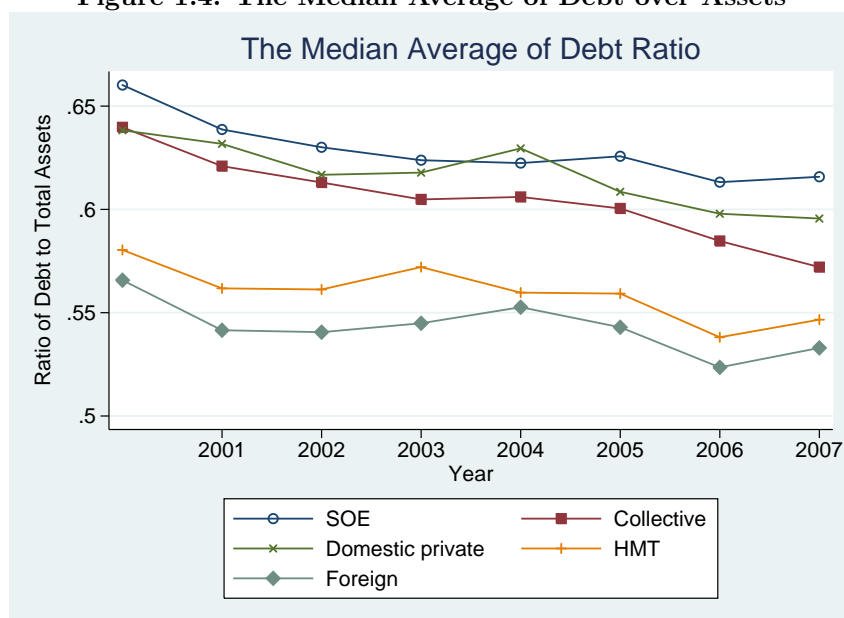


Figure 1.4: The Median Average of Debt over Assets



maintain the lowest leverage, probably because there are more hurdles to negotiate before they can get a bank loan. As shown in Figure 1.4, the SOE ratio of interest payments to total cost remains highest from 2000 to 2007, although the gap with other types of firms shrinks as the trends of all firms converge. While SOEs hold the most debt, they also pay lower real interest rates than their domestic counterparts. HMT and foreign firms pay interest rates on par with SOEs as they enjoy ready access to international credit sources.

Firm performance is further summarized in Figure 1.7, Figure 1.8, Figure 1.9, and Figure 1.10. SOEs generated the lowest profit per employee in 2000, but start

Figure 1.5: The Median Average of Interest Payment over Total Costs

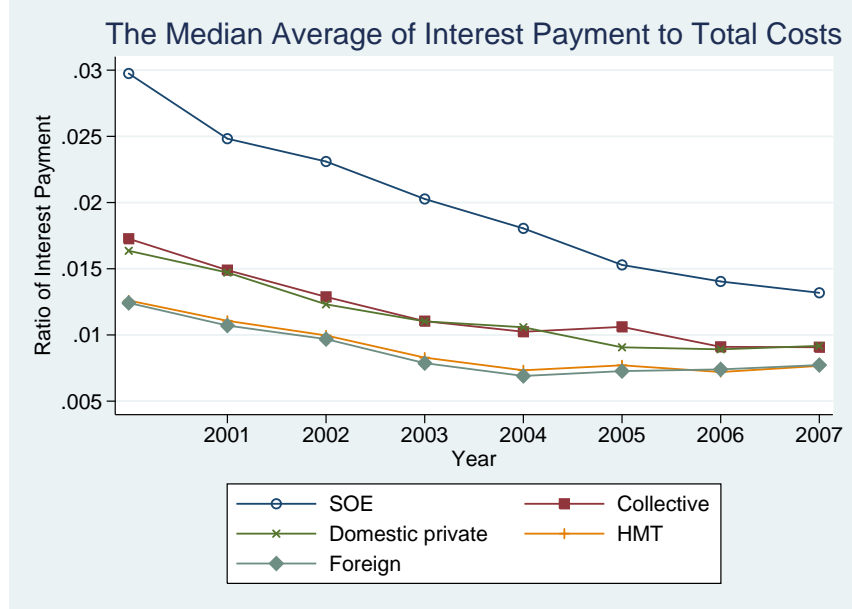
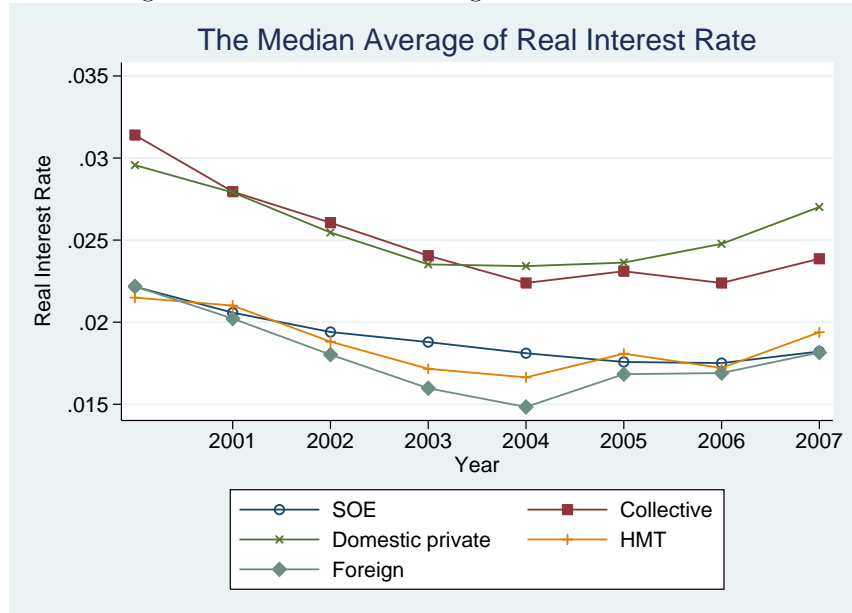


Figure 1.6: The Median Average of Real Interest Rate



to catch up with collective, private domestic, and HMT firms thereafter. Profit per employee of foreign firms is constantly highest from 2000 to 2007. The same case for profit margin as shown in Figure 1.8. SOEs start out with significantly lower net profit ratios, but swiftly converge with the patterns of other firms between 2005 to 2007. Foreign and private domestic firms consistently hold onto the top and runner-up spots. The picture for return on equity is slightly different. Private domestic firms and collective firms remain tied for the top spot. SOEs consistently show the lowest return on equity among all types of firms.¹² In Figure 1.10, we see the TFP of SOEs starts out well below all other types of firms in 2000, but then gradually narrows the gap. As in Table 1.2, foreign firms retain the top position as the most technologically advanced firms throughout the sample period.

To sum up, SOEs perform in distinctly different ways than the four other types of firm considered during the observation period of 2000–2007. Nevertheless, the differences narrow significantly after 2005. We now ask if this change was caused by increasing competition with domestic firms or other reasons such as loss of monopoly power.

¹²Interestingly, we find both profit margin and ROE experienced a significant rise after 2005. We conjecture there are probably three reasons for this upward inflection. Firstly, the SOE reform has mainly finished by 2005 which lead to a bigger jump in firm performance by SOE than other types of firms as shown in Figure 1.8 and Figure 1.9. Another reason is probably because of the rise in the overall economic performance, as shown by China's GDP growth rate which is below 11% in 2004 but start to operate at a much higher level since 2005. The rate in 2003, 2004, 2005, 2006, 2007, and 2008 are 10.0%, 10.1%, 11.3%, 12.7%, and 14.2%, respectively. As such, it is understandable that the overall firm performance experienced a jump starting 2005. The third explanation could be that part of this increase comes with an extensive 2005 survey that identifies many private firms with annual revenues over RMB 5 million. Most of those firms are newly developed while fast growing ones and thus drives up the overall performance.

Figure 1.7: The Median Average of Profit per employee

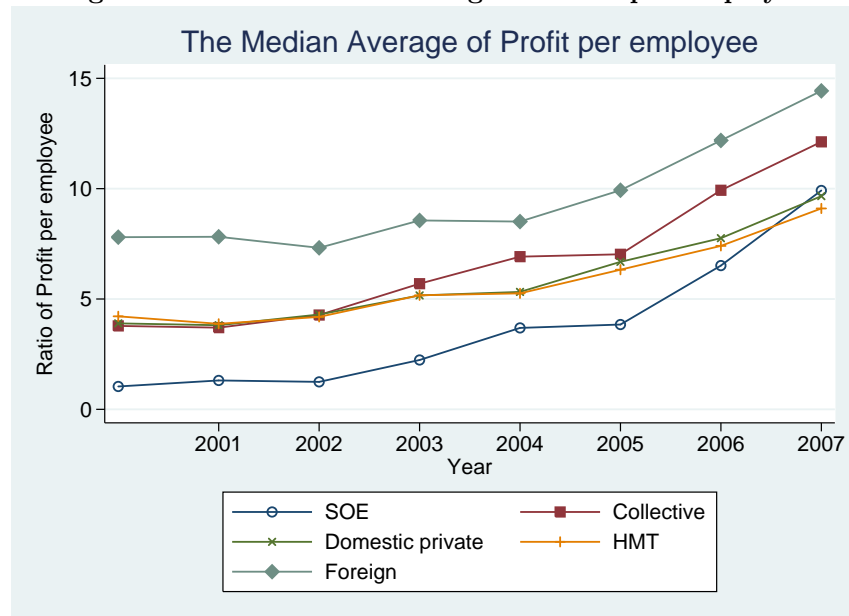


Figure 1.8: The Median Average of Net Profit Ratio

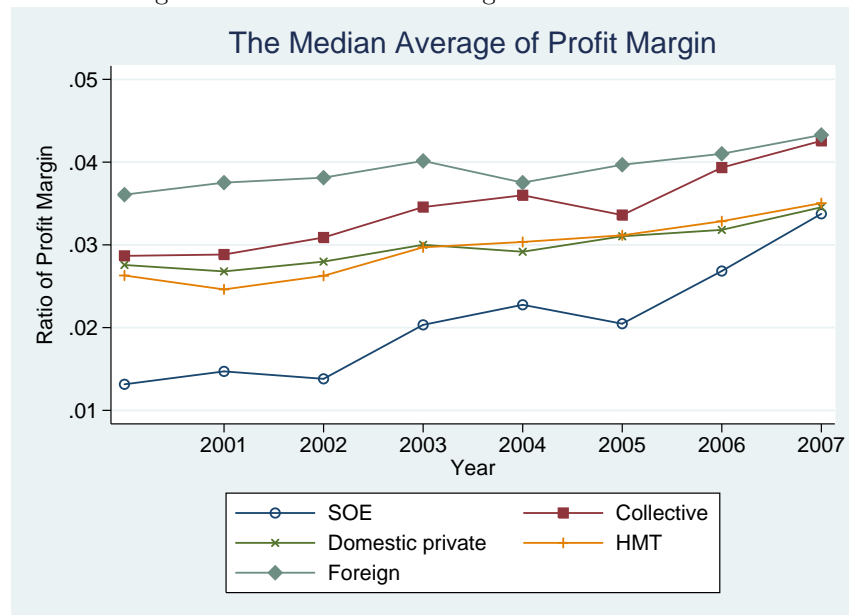


Figure 1.9: The Median Average of Return on Equity

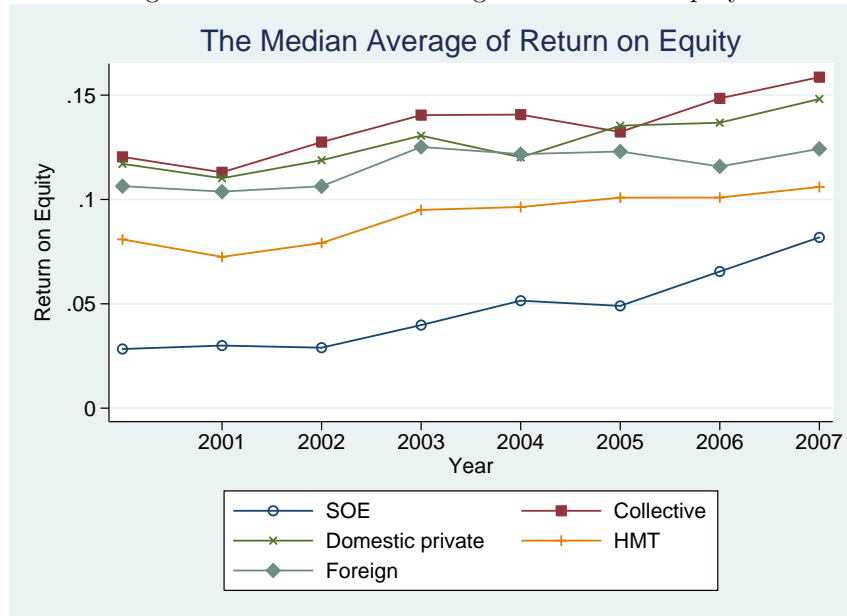
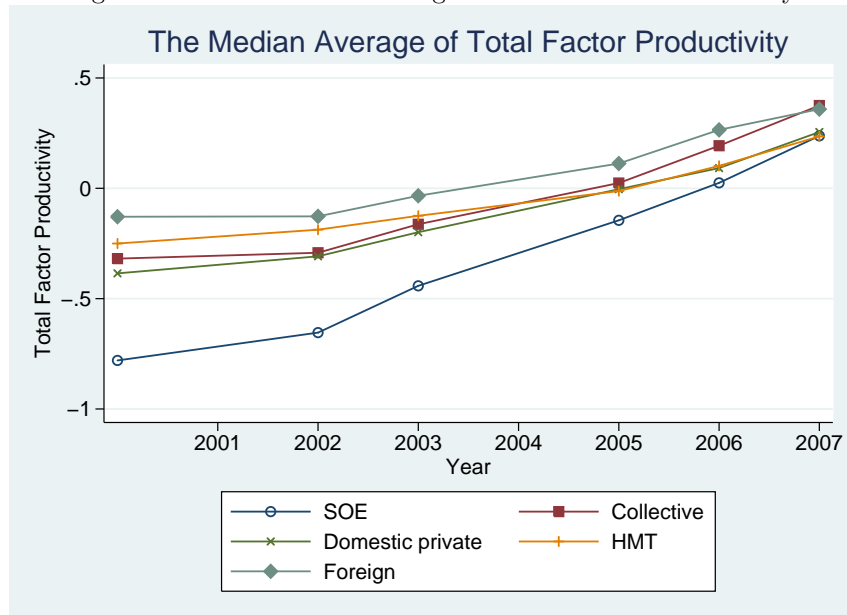


Figure 1.10: The Median Average of Total Factor Productivity



1.4 Empirical strategy

1.4.1 Specification and regression results

We firstly use a reduced-form equation to determine the correlation between ownership and investment behavior. Following Gilchrist, Sim, and Zakrajsek (2010), Cull and Xu (2005) and others on the investment determination function, we obtain our empirical investment equation with the following reduced-form regression specifications:

$$\begin{aligned} \log(I_{i,t}/K_{i,t-1}) = & \alpha + \beta_1 FC_{i,t} + \beta_2 OWNERSHIP_{i,t} + \beta_3 FC_{i,t} * \\ & OWNERSHIP_{i,t} + \delta FIRM_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1.1)$$

where the dependent variable, $\log(I_{i,t}/K_{i,t-1})$, reflects the natural logarithm of investment of firm i in period t to the firm's replacement value of its capital stock in period $t - 1$. $FIRM$ is a vector of control variables, including firm scale, as well as export and corporate investment prospects. FC is a vector that measures financial constraints. $OWNERSHIP$ is a categorical variable for ownership with state-owned firm as the default. $FC_{it} * OWNERSHIP_{it}$ is an interaction term that captures the interactions of financial constraints with ownership to affect firm investment behavior to see whether the impact of financial constraints on firm investment varies depending on the type of ownership. We firstly estimate specification (1) by fixed effects for panel data.¹³ However, empirical investment literature, such as Gilchrist and

¹³As shown in the specification and estimation strategy, the main variance from firm ownership variable is the change in the firm ownership status. There are mainly two definitions for firm ownership status in the questionnaires:

Himmelberg (1995) and Eberly, Rebelo, and Vincent (2012), have well documented that lagged investment effect is economically an important determinant of current investment at firm level. As such, we also consider a dynamic specification of the reduced-form:

$$\begin{aligned} \log(I_{i,t}/K_{i,t-1}) = & \alpha + \log(I_{i,t-1}/K_{i,t-2}) + \beta_1 FC_{i,t} + \beta_2 OWNERSHIP_{i,t} + \beta_3 FC_{i,t} * \\ & OWNERSHIP_{i,t} + \delta FIRM_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1.2)$$

To obtain consistent estimates of specification (2), we use Arellano and Bond (1991a)'s first-difference Generalized Method of Moments (GMM) estimation for the dynamic specification as corporate investment behavior tends to be highly serially correlated, i.e. firm investment decisions rely closely on economic indicators from the last period or several periods ahead. Another reason is because in dynamic specifications with firm fixed effects and relatively few time periods, both OLS levels and within-firm group estimates will be biased (Nickell, 1981). Lastly, when adjustment costs for investment are high and firms face passing shocks to cash flow, firms may choose to iron out investment and thus obscure the long-run relationship between investment and cash flow (Brown and Petersen, 2009).¹⁴ However, for difference GMM estimator to be valid, consistent and efficient, two critical assumptions must be satis-

ownership based on registration type and ownership based on real capital received. The first definition is based on original firm registration type at the Gong Shang Guan Li Ju (China Administration for Industry and Commerce) while the second one is based on the dynamic change in composition of the paid-in capital. After excluding those who switch between SOE and other types more than twice, we find that around 17% of SOEs are already changed their status based on second definition while remains SOE registration type. Therefore, our definition of ownership status is mainly based on second definition, the real paid-in capital.

¹⁴Brown and Petersen (2009) point out that if investment responds to consistent component rather than the transitory component, such as adjustment costs, the estimated cash flow coefficient in a dynamic specification with fixed effects will be biased downward. One approach, proposed by Himmelberg and Petersen (1994), is to instrument cash flow with lagged values to recover the long-run relationship.

fied. First, regressors must be predetermined by at least one period, which is hard to test with existing econometric tools. Second, the error terms should not be serially correlated (Arellano and Bond, 1991b; Forbes, 2000). For the first assumption, we simply use the lagged value as the respective instruments of those potential endogenous variables. To test the second assumption, we firstly make Sagan/Hansen test, which is used for overidentifying restrictions. Under the null hypothesis of instrument validity, the asymptotically distribution can serve as chi-square test where the degrees of freedom is the number of instruments less the number of parameters. The alternative method is to make first-order and second-order serial correlation test. We report the results of these two tests in the regression tables. Following Gilchrist and Himmelberg (1995) and Forbes (2000), we use two period lagged value as instruments for endogenous regressors. One main reason for us to choose $t - 2$ as instruments is that it passed the Sagan/Hansen J test for validity and Arellano-Bond test for autocorrelation test while not risking losing too many observations.¹⁵ Therefore, our first-difference GMM estimator use the moment condition as follows:

$$E\{\log[I/K]_{i,t-s}[\varepsilon_{i,t} - \varepsilon_{i,t-1}]\} = 0, \text{ for } s \geq 2; t = 3 \dots, T$$

$$E\{X_{i,t-s}[\varepsilon_{i,t} - \varepsilon_{i,t-1}]\} = 0, \text{ for } s \geq 2; t = 3 \dots, T$$

where $\log[I/K]$ is the investment rate, simplified version of $\log(I_{i,t}/K_{i,t-1})$. $X_{i,t-s}$

¹⁵Generally, the second-lagged value is better than the first-lagged value since the second-lagged is not correlated with the current error term while the first-lagged is. Also, whereas it is common to use regressors more than three times as the instruments for data with large N , it will significantly decrease the sample size. Bond (2002) point out that deeper lags of the instruments are only included if they can improve the specification test when the Sargan test and/or second order autocorrelation tests. As such, we mainly use our regressors lagged twice time as instruments. However, we also tested deeper lags as sensitivity analysis and the patterns are mostly the same.

are the potential endogenous independent variables for firm i . t and s are the time periods. The moment conditions imply that the twice or further lagged values of investment rate and other independent variables contained in a conditioning information set which can be used as instrumental variables for the first-difference GMM estimators.

To identify the best indicator of financial constraints, we start by screening indicators used in the literature. Following Guariglia, Liu, and Song (2011), we take internally generated cash flow as an internal financial constraint measurement. Table 1.3 displays the regression results with fixed effect estimation and GMM estimation for equation (1). Columns (1) and (2) report the results without interaction terms. Columns (3) and (4) display the results with interaction terms between ownership and cash flow to examine whether the effect of internally generated capital to corporate investment differs among firms depending on form of ownership. Generally, the pattern for GMM estimation and fixed effects is quite consistent. In columns (1) and (2), we find that internally generated capital (cash flow) has a positive and highly significant effect on corporate investment.¹⁶ Our results further show that firms with other forms of ownership (collective, private domestic, HMT, or foreign) invest significantly more than SOEs. This is consistent with the existing literature that shows the relative contribution of SOEs to total output has decreased over the past decade. The coefficient (0.115) in column (1) implies that, compared to SOEs, private domestic firms are on average about 11.5% more likely to invest in fixed assets. Similarly, the investment levels of collective firms are 10.9% higher, HMT firms 26.7% higher, and foreign firms 22.4% higher than SOEs. The investment behavior

¹⁶We also run regressions without controlling for industry or province fixed effects. While there is difference in coefficient, the significance of main variables remain the same. The results are available on request.

of large firms measured by sales follows an inverted U-shaped curve as indicated by the positively significant coefficient of firm sales and negatively significant coefficient of its square term.¹⁷ Similarly, we find export firms exhibit an inverted U-shape with the turning point at RMB 300,000 in 1998 prices. Small firms are more likely to be labor intensive, and thus get along with fewer fixed assets than large capital-intensive firms. The point at which the firm requires more sophisticated manufacturing machines marks the shift to more capital-intensive manufacturing. This is consistent with earlier findings that Chinese export firms mostly engage in light industry and are not necessarily the most efficient ones.¹⁸ As expected, firm performance and investment prospects (measured by profit margin) are positively and significantly associated with corporate investment for both fixed effect estimation and dynamic panel estimation.¹⁹

Columns (3) and (4) in Table 1.3 include the interaction terms. We find that the coefficient on interaction terms between internal finance and private domestic firms are statistically significant and larger than for SOEs, and much larger than for HMT, collective, and foreign firms, regardless of whether we use fixed effects or GMM estimation. This suggests private domestic firms are most dependent on internally generated cash flow to finance their investments. These results could also reflect the limited access of private domestic firms to external financial market and

¹⁷The calculation suggest the turning point lies about where a firm's sales exceed RMB 2.2 billion in 1998 prices. Below that level, firms tended to reduce their fixed asset investments.

¹⁸The issues is far from resolved. Some research finds China's exporters are typically less productive and sell less in the domestic market than non-exporters due to fierce domestic competition Lu (2012).

¹⁹We also did the regression with ROE (return on equity) to measure firm performance and investment prospects. Again, they are positively and significantly correlated with a firm's investment in fixed assets.

Table 1.3: Firm Investment, Financial Constraints and Interaction with Ownership

	(1)	(2)	(3)	(4)
	FE	GMM	FE	GMM
Ratio of Cash Flow over Capital	0.004*** (0.001)	0.038*** (0.006)	0.003*** (0.001)	0.040*** (0.005)
Domestic Collective Firms	0.109*** (0.018)	0.445 (0.511)	0.109*** (0.018)	-0.145 (0.085)
Domestic Private Firms	0.115*** (0.018)	0.622** (0.311)	0.113*** (0.018)	0.084 (0.091)
HMT Firms	0.267*** (0.026)	0.504 (0.668)	0.262*** (0.026)	0.205 (0.118)
Foreign Firms	0.224** (0.026)	0.219 (0.526)	0.220*** (0.026)	0.133 (0.121)
Ratio of Cash Flow over Capital *			0.002***	0.081***
Domestic Collective Firms			(0.000)	(0.005)
Ratio of Cash Flow over Capital *			0.015***	0.020***
Domestic Private Firms			(0.000)	(0.006)
Ratio of Cash Flow over Capital *			0.006***	0.080***
HMT Firms			(0.000)	(0.008)
Ratio Cash Flow over Capital *			0.008***	0.132***
Foreign Firms			(0.000)	(0.008)
Log Export	0.016*** (0.005)	0.005 (0.022)	0.016*** (0.005)	0.008 (0.021)
Square Term of Log Export	-0.0023*** (0.0005)	-0.0004 (0.0027)	-0.0023*** (0.0005)	-0.0006 (0.0027)
Log Sales	0.454*** (0.038)	0.723*** (0.206)	0.413*** (0.038)	0.634** (0.192)
Log Sales Square	-0.016*** (0.002)	-0.092*** (0.009)	-0.015*** (0.002)	-0.086*** (0.008)
Profit Margin	0.026*** (0.012)	0.546*** (0.119)	0.076*** (0.012)	0.460*** (0.108)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes
Number of Observations	543439	322166	543439	322166

Notes: * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Robust asymptotic standard errors reported in parentheses are clustered at the firm level and reported in parentheses. Sample period is from 1998 to 2007 at an annual frequency. The dependent variable in all specifications is $\log(I_t/K_{t-1})$, the logarithm of investment of firm i in year t to replacement cost in year $t - 1$. All specifications include time fixed effects and firm fixed effects. Time dummies and time dummies interacted with industry dummies are included in all the specification. The GMM estimation is by first-difference specification with instrument $\log((I_{t-1}/K_{t-2}))$. The lagged investment variables are not reported here since the fixed effects estimations don't include dynamic specification. However, the coefficients of lagged investment variables are both positively significant. The P-value for Sagan/Hansen J test in specification (2) and (4) are 311% and 18% respectively, indicating no significant problems identified since the estimation cannot reject the null hypothesis of instruments validity. The P-value for second-order serial correlation test, Arrellano-Bond test, in specification (2) and (4) are 23% and 27%, respectively, showing that the null hypothesis of no autocorrelation cannot be rejected. Therefore, no serious problems with specifications and estimations were find based on our tests. We have also done sensitive analysis for lagged value of three years and the patterns are generally the same. The results are available upon request.

need to finance investment out of retained earnings. More specifically, for the fixed effect estimation in column (3), the coefficient on interaction term between cash flow and private domestic ownership is 0.0015, the highest value for any type of firm. It indicates that private firms are most sensitive to internal cash flow and around 12.8 percent more likely to rely on internal cash flow to financing investments than SOEs under our fixed effect estimation.²⁰ Likewise, the coefficient on the interaction between collective and internal cash flow is also positive suggesting the investment of collective firms are more dependent on internal finance than SOEs. The interaction terms for HMT and foreign firms are both positive and significant. By calculation, we find the difference between SOEs and other types of firms less significant under fixed effects estimation, i.e. collective firms 1.7 percent, HMT firms 2.5 percent, and foreign firms 3 percent. Other regressors are also mainly the same as the specifications without interaction term, indicating that the results are quite robust to adjustment for covariates and our alternative estimation strategy.²¹ For example, the scale measured by total sales still presents inverted U-shaped curve, while the correlation between export and corporate investment changes to linear as the square term is no longer statistically significant. As expected, the profit margin used to measure investment prospects remains positively correlated with corporate investment with both GMM and fixed effect estimations.

²⁰For the coefficient for the ratio of cash flow to total assets, the partial effect is 0.003 for an SOE and 0.0045 for a private domestic firm.

²¹We offer several robustness exercises in the appendix, including samples with exclusive “permanent” firms and samples with extreme observations.

1.4.2 Heterogeneity of SOEs: Evaluating the impact of the “Grasp the Large, Let Go of the Small” policy

As mentioned, we are also interested in the policy implications of China’s major economic reform for SOEs launched in 1998. The fundamental idea of this reform was to keep the big and strategic SOEs under government control, mainly central and provincial governments, while letting the small and less critical SOEs go private or compete head on with the private sector. There is surprisingly little research evaluating the policy implications for firm investment behavior, particularly the de facto creation of different levels of access to the formal financial system. Moreover, the range of economic performance is vast. Some giant SOEs control dominant market positions and enjoy phenomenal profitability in areas while the competition can barely eke out an existence. Other SOEs are mediocre performers within highly competitive sectors. Therefore, unlike comparing the difference in mean average by controlling the dummy variables in the previous part, we investigate the difference by first grouping them and comparing the difference in coefficients of the ratio of cash flow to capital stock.

We first investigate the heterogeneity of SOEs by looking at the percentile distribution for firm scale based on firm sales, total assets and the Herfindahl-Hirschman Index (HHI).²²

Part I of Table 1.4 shows the percentile distribution of firm sales by ownership.

²²This is the Herfindahl-Hirschmann index of concentration, adapted to this purpose. The measurement index in Table 1.4 is the sum of squared shares of each firm’s sales in its two-digit industry in each specific year. The mathematical form is expressed as $HHI = \sum_{i=1}^n MS_i^2$, where MS_i is the market share, measured here by firm sales, of i th firm in an industry comprising n firms. Higher values indicates that a fewer firms account for a large share of the market power, measured by sales, in its industry. For robustness purpose, we also experimented the calculation of HHI index by total assets and find the pattern quite robust. Detailed results are available upon request.

Overall, we find SOEs tend to be more polarized than other firms, with the bottom 5 % and 10 % of SOEs smaller than for other types of firms, and the top 5 % and 10 % much larger than other types of firms. For instance, the sales of bottom 5 % SOEs is only about a quarter that of the second smallest type of firms, collective firms. However, firm sales of the top 5 % of SOEs are more than three times that of collective firms, although the difference is not as large as for foreign firm. The landscape is largely similar, but somewhat differs for the other firm scale dimension, total assets.

Part II of Table 1.4 suggests that the total assets of the bottom 5 % of SOEs are as small as private domestic and collective firms, and only half the size of foreign and HMT firms. However, for the bottom 10 % and above, SOEs quickly move upwards the assets ladder with their bottom 10 % cohort almost matching foreign and HMT firms. Moreover, the top 5 % of SOEs have three times of assets of foreign firms and over ten times as much as private domestic firms, the smallest cohort. Combining Part I and Part II, by simple calculation we find the asset utilization ratio of SOEs, measured by the firm sales divided by total assets, are much lower than other patterns of firms.²³ For example, for the bottom 5 % cohort, the ratio for SOEs are around 33 % when other types of firms are around 100 %. Similarly, the ratio of SOEs for all percentile cohorts are no more than 50 %, compared with the rest of firms with around 100 % asset utilization ratios.

Part III of Table 1.4 reports the basic quantile distribution of the HHI index to measure market power for different types of firms. We find generally that SOEs

²³The lower asset utilization of SOEs could also be due to the fact that SOEs are mostly in heavy industry and tend to have higher assets and lower turnover rates. While there are a number of ways to measure the asset utilization ratio, we only use the most common measurement since this is not a major concern here.

have more market power than other firms at all quantile levels. However, the edge becomes larger as the percentile moves up. For example, for the bottom 5 %, the difference between SOEs and private domestic firms is only around 10 %, while other types of firms have very similar market power. However, for the top 5 % of category, SOEs have at least 30 % more market power than private domestic firms and at least 10 % more than other types of firms. Therefore, the edge of SOEs over other type of firms in market power grows with increasing market concentration. Said another way, SOEs are more likely to be in more concentrated or less competitive industries than other types of firms.

To delve into the just how polarized SOEs are in their investment behavior compared to other types of firms, we run regressions to see how different in their dependence on internally generated finance. Table 1.5 displays the regression results with fixed effect for the bottom 10 % cohort of firms within their group. Overall, the table is consistent with Table 1.6, which includes all samples.

Likewise, we argue that the coefficient of internal cash flow is the appropriate measure of financial constraints on investment. The larger the coefficient, the more sensitive corporate investment is to cash flow. After controlling for other regressors as in the previous part, we find the internally generated cash flow is significantly associated with corporate investment for all types of firms for both the top and bottom 10 % cohorts. For the top 10 % cohort, we find that the coefficient of SOEs is smaller than for the other types of firms; only a quarter that of private domestic firms, indicating that the investment of top 10 % of SOEs are less sensitive on their

Table 1.4: Ownership and Percentile Distribution of Sales and Total Assets

Percentile	SOE	Collective	Private	HMT	Foreign
Part I: Distribution based on Firm Sales (in Million RMB)					
Low 5% Firm-Year	12.90	48.74	56.49	67.95	74.12
Low 10% Firm-Year	23.02	60.16	71.91	91.28	102.99
Median of Firm-Year	239.67	185.26	242.46	368.15	480.58
Top 10% Firm-Year	3337.40	1109.61	1308.10	2231.47	3669.87
Top 5% Firm-Year	8057.16	2114.96	2287.34	3970.56	7163.75
Part II: Distribution based on Total Assets (in Million RMB)					
Low 5% Firm-Year	36.09	30.92	31.64	56.26	59.40
Low 10% Firm-Year	62.86	44.03	43.41	80.16	87.43
Median of Firm-Year	559.36	166.21	159.12	343.95	467.54
Top 10% Firm-Year	7277.38	1165.06	1012.08	2240.63	3669.54
Top 5% Firm-Year	19146.41	2338.94	1892.76	4021.26	6705.20
Part III: Distribution based on Herfindahl- Hirschman Index					
Low 5% Firm-Year	0.0041	0.0034	0.0034	0.0036	0.0036
Low 10% Firm-Year	0.0076	0.0060	0.0048	0.0048	0.0050
Median of Firm-Year	0.0247	0.0216	0.0176	0.0196	0.0225
Top 10% Firm-Year	0.1036	0.0904	0.0749	0.0830	0.0930
Top 5% Firm-Year	0.1541	0.1401	0.1175	0.1330	0.1426

Notes: All variables were deflated using provincial ex-factory PPI (producer price indices) from National Statistical Bureau. Sales and total assets are in million RMB. Herfindahl-Hirschman Index is mathematically constructed as $HHI = \sum_{i=1}^n MS_i^2$, where MS_i is the market share, measured here by firm sales, of i th

firm in an industry comprising n firms. We also have calculated the HHI by assets and the pattern remain the same. The results are available upon request.

own generated cash flow and thus less externally financial constrained. Notably, the coefficient of foreign firms comes close to that of SOEs, probably because foreign firms have better access financing access from their parent or other international sources. The picture for the bottom 10% of firms is more complicated than for the top cohort. Overall, we find that the difference between the coefficient of SOEs larger than for private domestic firms and HMT firms. This could be an outcome of “Letting Go of the Small” policies that leave smaller SOEs to fend for themselves, forced to compete with other types of firms while receiving less government attention and cut off from subsidies.²⁴

²⁴The coefficients of most regressors are not statistically significant. This is understandable since the covariances of controlled variables for specific cohorts tend to be smaller than for the full sample data.

Table 1.5: Firm Investment and Financial Constraint for Subgroup

	The Top Ten Percentage of Firm Cohort by Sales				
	SOE	Collective	Domestic Private	HMT	Foreign
Ratio of Cash Flow over Capital	0.002*** (0.0005)	0.0035*** (0.0001)	0.0086*** (0.0001)	0.0057** (0.0003)	0.0021*** (0.0002)
Log Export	0.027 (0.032)	0.031 (0.054)	0.018 (0.026)	0.008 (0.047)	-0.015 (0.040)
Square of log Export	-0.003 (0.003)	-0.005 (0.006)	-0.003 (0.003)	-0.002 (0.004)	0.001 (0.004)
Log Sales	1.015 (3.268)	1.935 (7.129)	-2.520 (4.804)	3.400 (9.046)	-10.779 (6.726)
Square of log Sales	-0.043 (0.135)	-0.087 (0.320)	0.098 (0.212)	-0.156 (0.382)	0.429 (0.274)
Profit Margin	0.044 (0.141)	0.721** (0.353)	1.104*** (0.238)	0.258 (0.392)	0.002 (0.277)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes
Number of Observations	16876	16635	49230	9170	3621

Notes: * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Robust asymptotic standard errors are clustered at the firm level and reported in parentheses. Sample period is from 1998 to 2007 at an annual frequency. The dependent variable in all specifications is $\log(I_i/K_{t-1})$, the logarithm of investment of firm i in year t to replacement cost in year $t - 1$. All specifications include time fixed effects and firm fixed effects. Time dummies and time dummies interacted with industry dummies are included in all the specification.

Table 1.6: Firm Investment and Financial Constraint for Subgroup

	The Low Ten Percentage of Firm Cohort by Sales				
	SOE	Collective	Domestic Private	HMT	Foreign
Ratio of Cash Flow over Capital	0.030*** (0.007)	0.047*** (0.014)	0.021*** (0.005)	0.168*** (0.031)	0.0564*** (0.0202)
Log Export	0.428 (0.337)	-0.180*** (0.169)	0.009 (0.113)	-0.092 (0.110)	-0.075 (0.105)
Square of log Export	-0.105 (0.058)	0.027 (0.022)	-0.002 (0.014)	0.007 (0.013)	0.008 (0.013)
Log Sales	2.057 (2.874)	-7.224*** (1.974)	-0.334 (2.083)	-4.338 (3.790)	-0.041 (2.512)
Square of log Sales	-0.143 (0.204)	0.470*** (0.126)	0.029 (0.129)	0.281 (0.224)	0.019 (0.149)
Profit Margin	0.013 (0.038)	0.162 (0.191)	0.158 (0.143)	0.694** (0.251)	0.211 (0.145)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes
Number of Observations	11248	11093	19692	6114	6128

Notes: * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Robust asymptotic standard errors are clustered at the firm-year level and reported in parentheses. Sample period is from 1998 to 2007 at an annual frequency. The dependent variable in all specifications is $\log(I_i/K_{t-1})$, the logarithm of investment of firm i in year t to replacement cost in year $t - 1$. All specifications include time fixed effects and firm fixed effects. Time dummies and time dummies interacted with industry dummies are included in all the specification.

To further investigate how SOEs differs from other types of firms in their investment behavior, especially the impact of the SOE reform policy, we introduce into the most widely used market concentration measurement, the Herfindahl-Hirschman (HHI) Index, to test the role of market monopoly power in investment behavior among SOEs and other patterns of firms. As discussed, several studies suggest that this policy has led to a higher concentration of big SOEs with monopolistic power that boosts their profit margins and amplifies their cozy relationships with SOE-dominated financial institutions. In another words, effects that make SOEs much less likely to face financial constraints. Therefore, their investment decision will be even less dependent on their internal generated finance than, say, political motivations to further increase the size of their SOE. In contrast, smaller SOEs and those who are affiliated to provincial and city governments tend to have less market power and may have to compete with other types of firms. In another words, SOEs tend to be more polarized in their sensitivity to investment-cash flow than other types of firms.

Table 1.7 reports the regression results for the top 10% cohort in HHI index for each type of firm. From column (1) for SOE firms, we find that the coefficient of the ratio of cash flow to capital is the smallest of all firms. The investment behavior of SOEs in the top 10% market power cohort is least correlated to their internal generated funds. In another words, they are they are least likely to be financially constrained. The collective firms rank second with coefficients close to SOEs. This is understandable as they have good connections with local banks and may find it easier to raise shareholder capital to finance investments. Interestingly, we find foreign firms in the top 10% market power cohort are the most financially constrained, followed

by private domestic firms. It is understandable that private domestic firms face relatively higher financial constraints. Despite greater market power compared with SOEs and collective firms, they lack connections to the formal financial system and face more restrictions. The fact that the investment of foreign firms with top-tier market power are the most sensitive to cash flow may reflect limits on their capital flows inflow and restricted access to Chinese financing institutions.

Table 1.7: Firm Investment and Financial Constraint for Subgroup

The Top Ten Percentage of Firm Cohort by HHI index					
	SOE	Collective	Domestic Private	HMT	Foreign
Ratio of Cash Flow over Capital	0.072*** (0.019)	0.024*** (0.035)	0.119*** (0.026)	0.061** (0.026)	0.155** (.0745)
Log Export	0.002 (0.038)	0.014 (0.053)	-0.018 (0.025)	-0.039 (0.048)	-0.020 (0.043)
Square of log Export	-0.00014 (0.004)	-0.002 (0.006)	0.003 (0.003)	0.003 (0.005)	-0.001 (0.004)
Log Sales	-0.077 (0.232)	-0.211 (0.386)	0.666 (0.226)	0.339 (0.503)	-0.592 (0.440)
Square of log Sales	0.007 (0.010)	0.021 (0.019)	-0.029 (0.011)	-0.015 (0.023)	0.0313 (0.019)
Profit Margin	0.058 (0.089)	0.498** (0.254)	0.634*** (0.170)	-0.041 (0.193)	0.113 (0.142)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes
Number of Observations	16843	16655	49205	9172	9187

Notes: * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Robust asymptotic standard errors are clustered at the firm level and reported in parentheses. Sample period is from 1998 to 2007 at an annual frequency. The dependent variable in all specifications is $\log(I_i/K_{t-1})$, the logarithm of investment of firm i in year t to replacement cost in year $t - 1$. All specifications include time fixed effects and firm fixed effects. Time dummies and time dummies interacted with industry dummies are included in all the specification.

Table 1.8 shows the regression results for the bottom 10 % cohort regarding HHI index after we group the data. Without surprise, we find that for all types of firms except for foreign firms, the coefficient on the low 10 % cohort is much higher than the top 10 % cohort, consistent with existing research which finds that firms of smaller scale in more competitive industries face higher financial constraints. However, we think the reason for less sensitivity of foreign firms is because the restrictions on capital inflows for small foreign firms are much less than for large, market-dominant firms.²⁵ The focus of Table 1.8 is the SOE coefficient, which is the highest for all types of firms. In contrast, SOEs in more competitive industries with less market power face more financial constraints than other types of firms. This is understandable if such firms perform more poorly than other firms in their field and lack special access to the financial system. They are more likely to face higher financial constraints than regular firms since creditors have neither government guarantee nor future operating return. Also, as might be expected, private domestic firms are the second-most vulnerable group to internal cash flow, indicating that their status in the financial system does not vary much with their market power. In addition, collective firms and HMT firms are very close in their reliance on cash flow.

²⁵Foreign firms that wish to invest over \$50 million as FDI must get approval from the central government. Smaller FDI inputs only require permission from the appropriate provincial government. Other FDI restrictions may apply depending on the industry and market assessment.

Table 1.8: Firm Investment and Financial Constraint for Subgroup

The Low Ten Percentage of Firm Cohort by HHI index					
	SOE	Collective	Domestic Private	HMT	Foreign
Ratio of Cash Flow over Capital	0.260*** (0.074)	0.107*** (0.091)	0.161*** (0.022)	0.103*** (0.013)	0.012 (0.09967)
Log Export	-0.130 (0.076)	-0.036 (0.073)	0.015 (0.059)	0.080 (0.061)	-0.039 (0.108)
Square of log Export	0.010 (0.008)	0.005 (0.008)	-0.005 (0.006)	-0.009 (0.006)	-0.008 (0.011)
Log Sales	-0.316 (0.379)	-0.810 (0.539)	1.203 (0.548)	1.706 (0.675)	-0.835 0.599
Square of log Sales	0.015 (0.019)	0.044** (0.027)	-0.061 (0.026)	-0.081 (0.032)	0.041 (0.029)
Profit Margin	0.032 (0.096)	0.294 (0.345)	1.047** (0.533)	0.405 (0.361)	0.016 (0.163)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes	Yes	Yes
Number of Observations	11315	11245	19195	6172	5741

Notes: * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Robust asymptotic standard errors reported in parentheses are clustered at the firm level. Sample period is from 1998 to 2007 at an annual frequency. The dependent variable in all specifications is $\log(I_i/K_{t-1})$, the logarithm of investment of firm i in year t to replacement cost in year $t - 1$. All specifications include time fixed effects and firm fixed effects. Time dummies and time dummies interacted with industry dummies are included in all the specification.

To sum up, from both firm scale and firm market power perspective, we find the “Grasp the Large, Let Go of the Small” policy led to a polarizing treatment of SOEs. We find SOEs in top 10 % of our scale or market power cohorts face fewer financial constraints than their counterparts of other types of firms in the same cohort. For the bottom 10 % of SOEs, who tend to performing poorly against their counterparts and have little privilege or political connections under the reformed SOE policy, our results show they are more financially constrained than for other firm types in the same cohort.

1.5 Conclusions

Examination of the link between China’s financial system and the real economy reveals some interesting insights into Chinese economic growth, which bucks current views that high economic growth must be predicated on robust legal systems that protect property rights and sophisticated financial systems. To explain some of this incongruity, this paper examined how financial constraints interact with firm ownership to dictate investment behavior. We also investigated the heterogeneity in investment behavior among SOEs since the government’s adoption of the “Grasp the Large, Let Go of the Small” SOE reform policy that reduced benefits for small SOEs and boosted them for large enterprises. By the end of our observation period, 2007, state-owned enterprises were at least 20 % less likely to face financial constraints than other types of firms. We also documented the heterogeneity of SOEs, finding that SOE investment behavior and performance are more polarized than the rest of firms

due to the new SOE reform policy.

These results provoke a tantalizing question: How is firm productivity affected by credit misallocation because of ownership? As documented in this paper, ownership corresponds to access to credit. SOEs have preferential access to financing and this could translate into a misallocation of resources as lending is driven by institutional factors rather than market mechanisms. Thus, by measuring how much productivity growth is affected by such capital misallocation, we could determine the productivity gain for Chinese economy without the misallocation.

Chapter 2

Misallocation, Ownership, Financial Constraints

2.1 Introduction

The main driver of China's spectacular economic growth over the past thirty years has been the reallocation of labor and capital from a planned economy consisting of mainly state owned enterprises (SOEs) to a somewhat market-oriented economy with booming private manufacturing firms that have achieved huge productivity gains (Song, Storesletten, and Zilibotti, 2011). However, this process is still far from finished. The heterogeneity between domestic private firms and SOEs is still marked in many dimensions. An important such difference is in terms of access to credit, where SOEs typically have access to financing at favorable terms compared to privately-owned companies. This situation reflects the incomplete state of reform of both the industrial sector and the Chinese financial system. The banking sector is the most important part of the financial system by far in China, and is dominated by five massive state-owned banks. Political incentives make it so that state-affiliated

banks prefer to channel loans to state-owned enterprises or to investment vehicles created by local governments. Access to such credit remains for firms even with low profits or losses, giving rise to a situation of moral hazard since the Chinese government is widely seen as ultimately committed to ensuring that bank failures do not pose a threat to financial stability writ large or to the deposits of individual households. Loans are thus made by state-owned banks to state-affiliated industries companies even when an arms-length transaction might not take place.

A large body of literature emphasizes the importance of resource allocation to economic growth. The hypothesis that the misallocation of resources such as land, entrepreneurship, labor or capital accounts for a significant difference in economic performance between rich and poor countries has been supported by much research (Banerjee and Moll, 2010; Banerjee and Duflo, 2005; Hsieh and Klenow, 2009; Bartelsman, Haltiwanger, and Scarpetta, 2013; Alfaro, Charlton, and Kanczuk, 2008). Policy measures that allow resources to be reallocated from low productivity firms to high productivity ones would contribute to stronger economic growth.

Reforms are taking place in China's economy and in the financial sector. China introduced a program for SOE reform in 1996, focused on actions following the rubric of "Grasp the Large, Let Go of the Small." Under this approach, the state would maintain its ownership of, and support for, giant SOEs with dominant market positions in their industries, while smaller or less successful state-owned firms would gradually be made to face private competition and even eventually be sold off into private ownership such as with a management-led buyout. For the first category of firms, however, large SOEs could well enjoy phenomenal profitability while private competition is effectively squelched by the relatively disadvantageous access to

financing. Therefore, if large SOEs turn out to be less efficient than their private counterparts, reforms that allow for competition and for resources to be reallocated to the private sector could have meaningful positive implications for productivity and growth. As such, this paper assesses the extent to which the misallocation of resources arising from the easy access to credit enjoyed by state-owned firms translates into slower productivity growth—that is, whether easy financing makes firms lazy. If this is the case, then further liberalization that moves the Chinese industrial sector and financial system to be driven by market incentives could have immense potential to generate continued income gains.

While researchers have reached a consensus on the importance of resource misallocation for productivity and economic growth, there are differences in reasoning for the channel by which resource misallocation affects productivity growth. The focus of research has been on the underlying cause for different track records among similar and different types of firms (formally, one could say that there are heterogeneous production functions among firms). Perhaps the largest body of literature attributes production shortcomings to the misallocation of resources arising from financial market distortions. For instance, Banerjee and Duflo (2005) have reviewed the various microeconomics and institutional reasons for productivity growth distortions and emphasize the importance of credit constraints to the difference in TFP growth across different types of firms.¹ Zia (2008) estimates that the misallocation of credit arising from an export credit subsidy policy leads to a total loss of 0.75% of GDP in Pakistan. A related strand of literature focuses on the impact on productivity of trade

¹Banerjee and Duflo (2005) summarized extensively the reasons for the difference in productivity across countries. They point out that credit constraints seem pervasive in developing countries but didn't further discuss the various institutional reasons for this constraints across countries. Therefore, we focus specifically on the credit constraints because of ownership which leads to different access to credit market.

restrictions or labor market regulations. These generally indicate a strong negative relationship between trade barriers and aggregate productivity (Alcalá and Ciccone, 2004; Pavcnik, 2002; Lileeva and Trefler, 2007), and likewise a negative relationship between productivity growth and labor market distortions such as employment protections (Lagos (2006)). However, Banerjee and Duflo (2005), along with other researchers (see, e.g., Rosenzweig and Wolpin, 1993; Angeletos and Calvet, 2006), argue that the role of insurance programs such as unemployment insurance in rural area is actually opposite. The deficiency of access to insurance markets leads households to use productive assets as buffer stocks to smooth consumption and thus to put insufficient resources into investment, thereby hindering productivity growth in rural India. These authors further argue that this impact could be seriously underestimated for rural households in developing fields generally. Furthermore, some researchers see the prevalence of informal institutions as the source for misallocation. For example, transaction costs in doing business has been identified as responsible for resource misallocation. D’Erasmus and Moscoso Boedo (2012) proposed a model showing that countries with lower degree of debt enforcement and high costs of undertaking commerce in the formal business sector tend to have lower allocative efficiency and, after fitting their model with the World Bank Doing Business database, they identify a loss of up to 25 percent in terms of total factor productivity (TFP) in those countries relative to the United States.

Two main empirical approaches have been used to analyze the impact of resource misallocation on productivity. The first is a structural approach which fits a production function to firm-level data and directly estimates the dispersion of marginal products within industries (Banerjee and Moll, 2010). The appealing feature of this

approach is that instead of focusing on specific underlying factors, it emphasizes the impact of all aspects of resource misallocation on aggregate productivity growth. For example, a recent important paper by Hsieh and Klenow (2009) uses firm level data on manufacturing in India, China and the United States to identify the resource misallocation by comparing the dispersion of productivity in those three countries. They conclude that TFP in China and India would increase by 30 to 50 percent and 40 to 60 percent, respectively, if the misallocation could be reduced to the U.S. level.

A less structural approach to the analysis of heterogeneous production function across countries is to focus on the difference in firm sizes rather than marginal products. Using firm level data for 79 developed and developing countries, for example, Alfaro, Charlton, and Kanczuk (2008) find that the distortion related to monopolistic competition indicated by the firm size distribution could account for 0.58 of the log variance of income per worker between developing countries and the reference country, the United States. Another important paper by Bartelsman, Haltiwanger, and Scarpetta (2013) follows the methodology of Olley and Pakes (1996) by using the covariance between firm size and the average product of labor to measure allocative efficiency. Under this approach, if a more productive firm has a larger market share and uses a greater share of production inputs in an industry, then resources are efficiently allocated, and vice versa if not.

In achieving its steep growth trajectory, China has significantly improved the efficiency of resource allocation over the past thirty years, even while resource misallocation remains pervasive. Song, Storesletten, and Zilibotti (2011) constructed a growth model to account for China's high output growth and large trade surplus by reallocating labor and capital from SOEs with low productivity to private firms with

high productivity but that face financial frictions. Using a small data set consisting of a panel of around 2,000 firms from 1996 to 1998, Zhang, Zhang, and Zhao (2001) explore how SOE reform interacts with competition to affect efficiency. They find that while export competition appears to be associated with efficiency gains, the impact is not as significant as the relationship between ownership and productivity—that is, private firms are more productive than ones controlled by a level of government. Using a much larger firm-level data with roughly 22,500 manufacturing firms, Deng, Haltiwanger, McGuckin, Xu, Liu, and Liu (2007) find that the reallocation of resources in China has taken place not only between different types of firm ownership (private vs. SOE) but also within each specific type of firm due to heterogeneous production, with both forms of reallocation of resources contributing to higher productivity growth and thus economic growth from 1995 to 2003. To sum up, a major part of the literature emphasizes that improvement in resource allocation is associated with resources moving from low productivity SOEs to higher productivity firms driven by private incentives.

This study contributes to the literature in three ways. First, this paper draws on a comprehensive data set for China’s most important sector, manufacturing. The data cover over one million observations on the performance of individual firms from 1998 to 2007. Most data sets in the existing literature are much smaller. The sample encompasses approximately 90 percent of the gross output in the Chinese manufacturing sector over this period.

The second contribution comes from the method adopted based on the research by Olley and Pakes (1996) and Bartelsman, Haltiwanger, and Scarpetta (2013). While a number of papers have found the importance of resource reallocation to

productivity growth and economic growth, most of them either mainly focus on either theoretical models or structural methods. The empirical approach here is closer to that of a reduced form model, which sacrifices structure but allows for a more ready assessment of the empirical relationships. The structural and reduced form approaches are complements, together providing a picture of the extent of resource misallocation and implications for productivity growth. While Zhang, Zhang, and Zhao (2001) explored the difference in allocation efficiency between SOE and other types of firms using a reduced form model, the much larger data set and more direct method adopted here provide considerable additional insight.

The last contribution in this paper is that it shines a light on the impact of SOE reforms taken to date on firm productivity. China’s central government adopted a strategic policy in the late 1990s to reform SOEs by adopting the so-called “Grasp the Large, Let Go of the Small” approach. Despite its profound significance, this policy has not yet been evaluated as to its impact on allocative efficiency or productivity. This assessment is especially important because the distribution of SOEs is becoming more polarized. At one end of the spectrum, continued and strengthened government support has cemented into place huge SOEs with massive revenue streams and exceptional profitability due to their monopoly status within select industries such as telecommunications. At the other end, small and mid-sized enterprises (SMEs), especially those originally owned by local governments, face the prospect of having to obtain financing through market mechanisms rather than through an ongoing relationship with a state-affiliated lender. However, if those big SOEs have more market share because of monopoly power rather than higher productivity, the SOE reform policy could be seen as contributing to resource misallocation. This makes

it especially relevant to assess the impact of the SOE reform policy on resource misallocation and productivity growth.

The structure of the remainder of the paper is as follows. Section 2.2 briefly reviews the background information on China’s SOE reform and provides an overview of the data and statistical analysis on the main variables. Section 2.3 undertakes an empirical study of how ownership interact with financial constraints to affect allocative efficiency and investigates the implication of the “Grasp the Big, Let Go of the Small” SOE reform. Section 2.4 concludes.

2.2 Background information and data description

2.2.1 Background introduction

State owned enterprises (SOEs) dominated the Chinese economy before economic reforms began in the late 1970’s, producing more than two thirds of national output and accounting for more than 75 percent of total fixed asset investment.² Since 1978, however, SOEs have been the target of a succession of reforms. During the 1980s, the central government set up the guideline for SOE reform as “*Zheng Qi Fen Kai*” (To separate government and corporates) and “*Qi Ye Zi Zhu*” (To leave corporate independent). Another baseline measure introduced during this period was to maintain the major role of “all-people” having a dominant influence in the economy—broadly speaking, to avoid a concentration of economic power in private hands. With those guiding principles, SOE reform moved forward incrementally. For

²For more detailed information on the SOEs before 1978, please refer to the National Statistical Bureau website.

example, in 1984, SOEs were allowed to operate independently, though the change was more a legal formality and hardly implemented in practice at the time. In 1986, the central government introduced regulations for managers, followed by an legal independent status for SOEs and bankruptcy law in 1988. The purpose of these reforms in principle was to prevent SOEs from becoming a burden on the government treasury through the need for a bailout. Even three decades later, however, it is not clear that this objective has been achieved.

During the first half of 1990s, some important reforms were introduced. In 1993, a Company Law provided for new significantly legal statuses for firms including SOEs. In the same year, the important conference of the Third Plenary Session of The Fourteenth Communist Party Central Committee (CPCC) decided on a policy to build up a Market Economy with Chinese Socialist Characteristics. It announced a plan to turn at least 100 large SOEs into joint share companies in which government ownership would be joint with other investors. Even while a number of reforms were incrementally implemented, a series of problems still overhung the SOEs, notably that of worsening operating performance. In 1996, at lease half of SOEs were losing money compared with only 20 percent in 1992. The return on capital for SOEs was typically calculated as less than the prevailing interest rate at which SOEs obtained funds from state-affiliated banks, indicating the existence of an implicit subsidy by the government.³ While the share of SOE output in total industrial output shrank from 77.6 percent in 1978 to 28.8 percent in 1996, SOEs still employed 57.4 percent of urban workers and possessed 52.2 percent of industrial fixed assets at the end of the period (Lin, Cai, and Li, 1998). This suggests that an important reason for the loss

³For more detailed information, please refer to Bank (1997)

of competitiveness of SOEs was the political requirement to maintain employment even while attempting to compete with new private firms that began to form and were more competitive.

As such, reforms were speed up during the second half of the 1990s, driven by actions taken by China as part of its successful effort to join the World Trade Organization (WTO). Indeed, SOE reform was driven in part by the government's recognition that WTO accession would leave some SOEs vulnerable to competition from international counterparts. In 1995, over the Fourth Plenary Session of the Fourteenth CPCC, the official guidelines were set up for SOE reform: To Grasp the Big, Let Go of the Small. This approach called for swifter reform of SOEs by grasping key industrial sectors and thereby holding them closely within state control (and with government support), while pushing small and medium SOEs to face market pressures. The reasons for grasping the key industrial sectors are not only for national security or natural monopolistic reasons such as with the power grid but also for economic reasons.⁴ The Chinese government hoped to form around 1,000 cross-regional, crosssectional conglomerate SOEs that would accumulate capital quickly while improving management skills and thus be able to compete internationally. An eventual goal was for these firms to go public while the government remained as the majority shareholder. This process lasted for a few years until 2005 when a significant law passed to allow the listing of shares in the large SOEs on the nascent Chinese stock market. The ultimate goal of "To Let Go of the Small" was for the government (at various levels, not just national but also provincial and city) to take

⁴The loose definition for "The Big" SOEs are those on seven key areas and industries related to national security and economic lifelines, including military industry, electricity and the electrical grid, oil and the petrochemical industry, telecommunications, coal, civil aviation and shipping.

their hands off SOEs, at least in terms of their day-to-day operations. Various forms were adopted to reach those goals, such as mergers and acquisitions, joint venture, leasing, contracting, deregulation to invigorate competition, and selling off shares or privatization⁵. Generally, after the reform, large SOEs, except for big banks that remained controlled by the Chinese Treasury, were under the administration of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC). Smaller SOEs or firms controlled by local governments and not yet privatized were affiliated or controlled by the SASAC of their local governments.⁶ To sum up, the ultimate goal of this reform policy was that the government, especially the central government, would control, protect, and build up the international competitiveness of a limited number of large central and local SOEs, including by ensuring the monopolistic power of these favored firms and access to loans from government-affiliated banks. Most medium and small SOEs would be required to compete directly in the market.

The impact of “Grasp the Big, Let Go of the Small” reform policy has been profound. In less than a decade, China’s SOEs have emerged from having debt overhangs and uncompetitive production practices to become market dominant players, including through the exercise of monopolistic power. Various evidence shows this trend. For example, on the Fortune 500 list based on corporate revenue, the number

⁵Privatization process of SOEs in China in some places early 2000s is very similar to the shock therapy in former Soviet Union countries. A most significant approach is management-buyout (MBO) which transfer state assets to individual managers at usually much lower price than book value. Whereas this approach promoted trigger better performance for those companies, it also raise fierce debate as whether it is subject to social justice. In many cases, this strategy is under criticism as effectively transferring public wealth to a minority elite who collude with governments. One famous case is Lang-Gu dispute where academic scholar Larry H.P Lang, also a critic of the MBO reforms, accused Gu Chujun, a private entrepreneur, of illegally seizing state assets, which eventually lead to the conviction of Gu who was later imprisoned in January 2008.

⁶An important notes here is that local SASAC are administered by local government rather than higher-level SASAC. The fundamental thing is that those local SOEs are legally the assets of local governments instead of central government.

of Chinese firms has risen from 2 in 1996 to 100 in 2013. However, more than 90 of those 100 firms are SOEs either affiliated to central government or local governments. Furthermore, among those 100 firms, the 9 financial conglomerates account for more than 50 percent of total profits, suggesting that the other large SOEs are not nearly as profitable (or even loss-making).⁷ A similar list including the top 500 firms in China by revenue in 2013 also indicates that more than 62 percent of them are SOEs, with the total profit made by those SOEs seven times that of private firms. However, the profit per employee of private firms is twice as high as that for SOEs, at sixty thousand RMB compared to thirty thousand RMB⁸ This suggests that the continuation of large SOEs with enormous workforces reflects inefficient resource allocation, which would come about by the SOEs continued preferred access to credit. This phenomenon is explored next using firm level data from 1998 to 2007.

2.2.2 Data description

The data are from the China Annual Survey of Manufacturing Firms (CASMF) from 1998 to 2007. This is an annual firm-level survey conducted by the National Bureau of Statistics, and includes all state-owned enterprises (SOEs) and non-SOEs with sales over RMB 5 million (around \$600,000).⁹ For example, in 2007, the sample covered over 350,223 firms in cross-section (Table 2.1). The data contain all information on the firm's basic characteristics, such as ownership format, location, number of employees, and industry, and the three main accounting statements of the balance

⁷For further information on Fortunate 500 list, please refer to Fortune 500, 2014.

⁸The complete list and information is <http://www.cec1979.org.cn/c500/chinese/>.

⁹The exchange rate used here is US\$ 1 = RMB 8.0. The Chinese currency was basically pegged the dollar during our observation period, 1998–2007.

sheet, income statement, and cash flow. In all, the survey includes around 130 variables for each firm. The firms are largely involved in manufacturing, which is the main activity of 90 percent of all firms in China (the service sector is made up generally of small firms and very large ones and is thus more polarized than manufacturing).

Table 2.1 shows the ownership distribution and year of observation in the data by year and by ownership category, where firms can be state-owned, cooperative (firms that are the legacy of collective ownership, often within a village), private-owned, have ownership from Hong Kong, Taiwan, or Macau, or be foreign owned. The share of SOEs in the number of firms steadily declines over the period 1998–2007, with the number of SOEs three times greater than private domestic companies in 1998 but only one-twelfth the amount by 2007. The change reflects the fact that this data set only includes firms with annual revenues in excess of RMB 5 million. Private domestic companies are still relatively small in 1998, but the share of private domestic firms among observations rises dramatically from 0.85 percent in 1998 to 10.76 in 2007. Part of this increase comes with an extensive 2005 survey that identifies many private firms with annual revenues over RMB 5 million. The picture for collective firms is similar to SOEs; their share declines steadily from 1998 to 2007. Collective firms played an important role 1980s and early 1990s before restrictions on private ownership were relaxed. With ongoing privatization and competition from private firms and SOEs, collective firms steadily lose ground as many are privatized or go bankrupt. China’s WTO accession in late 2001 gave local governments a strong motivation to attract FDI, to generate both employment and tax revenue. Thus, we see the share of foreign companies in the total sample rise dramatically. The share of

Table 2.1: Distribution of Observations by Ownership Category

Year	SOE	Domestic	Collective	Foreign	HMT	Total
1998	2.61	0.85	2.36	0.49	0.71	7.02
1999	2.41	1.13	2.23	0.51	0.72	7.00
2000	2.04	1.58	2.08	0.56	0.75	7.01
2001	1.69	2.56	1.86	0.62	0.85	7.59
2002	1.49	3.33	1.70	0.71	0.92	8.14
2003	1.20	4.38	1.48	0.83	1.00	8.90
2004	1.20	7.52	1.25	1.38	1.34	12.68
2005	0.88	7.75	1.10	1.38	1.30	12.41
2006	0.77	9.17	0.97	1.52	1.38	13.81
2007	0.56	10.76	0.90	1.70	1.52	15.44
Total	14.85	49.02	15.93	9.69	10.5	100

Notes: (1) All numbers are in percentiles.

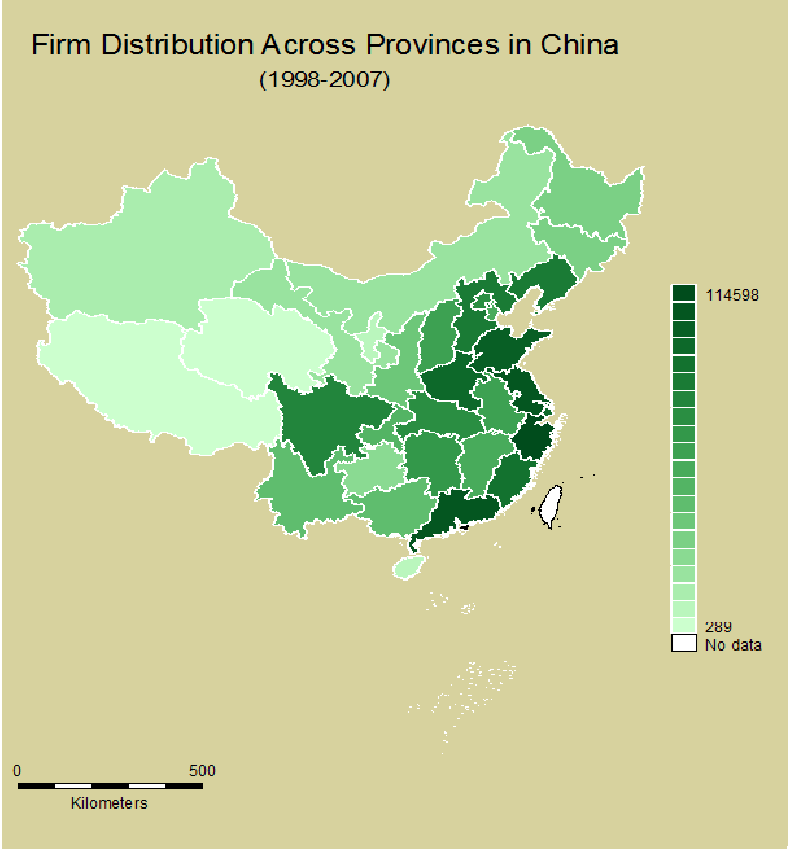
(2) HMT indicates Hong Kong, Macau and Taiwan.

firms with owners from Hong Kong, Macau, and Taiwan (HMT) only rises two-fold from 1998 to 2007, exhibiting milder growth than any other ownership formats. It may be that investors from these areas were among the first foreign investors to invest in China. HMT investors moved earlier, mostly in the 1980s and 1990s while other foreign companies were still reluctant to invest in China due to uncertainty, including perceived political risks. After 2000, when other international firms entered China on a large scale, the number of investors from HMT remains relatively stable. While the share of HMT firms is almost two times greater than foreign firms in 1998, the HMT number is smaller than for foreign firms by 2007.

The distribution of firms across regions between 1998 and 2007 is shown in Figure 2.1. Coastal provinces are much more heavily represented than inner provinces, indicating that coastal provinces have much more firms with annual revenue more than 5 million RMB. However, when we look at the Figure 2.2 which shows the

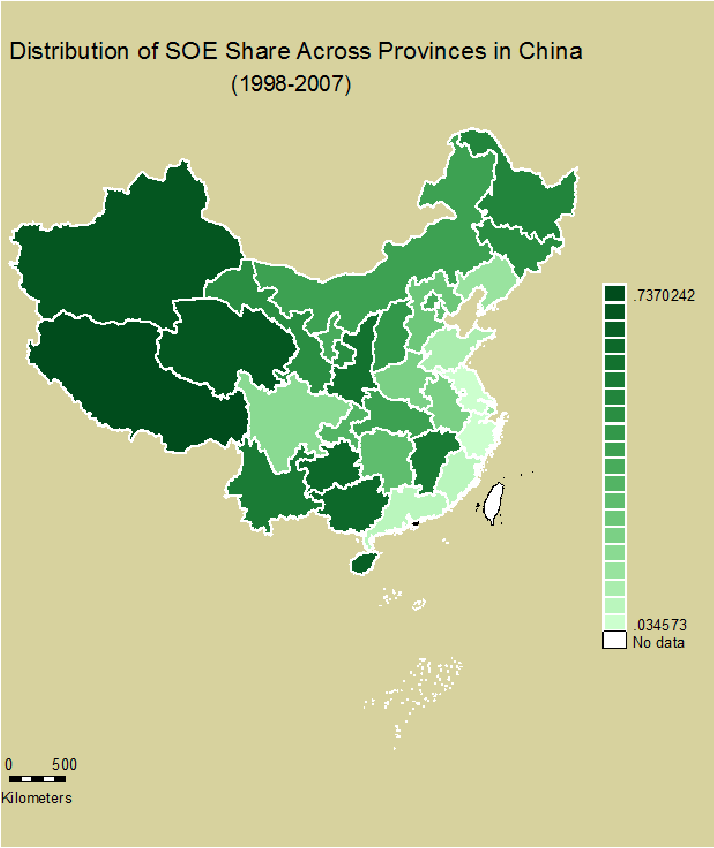
distribution of the SOE share across provinces, the picture changes dramatically. Provinces with more large firms tend to have a smaller share of SOEs, indicating that economic growth in these areas was mainly driven by non-SOE firms. This regional disparity can probably explain the fundamental reasons for the difference in economic performance between different parts of China. Coastal provinces historically had relatively fewer heavy manufacturing SOEs because the central planners who decided on state investment tried to avoid coastal provinces for national security reasons and sought to sustain economic activity in the interior of the country. This, in turn, meant that there was more space for the now-booming non-SOE firms.

Figure 2.1: Firm Distribution Across Provinces in China



Source: Author's mapping using CASMF.

Figure 2.2: Distribution of SOE Share Across Province in China



Source: Author's mapping using CASMF.

An aspect of the research question of this paper focuses on whether the higher ratio of non-SOEs in these regions is associated higher allocative efficiency. Following Bartelsman, Haltiwanger, and Scarpetta (2013), we mainly use three measures to gauge allocative efficiency at the firm-level: the within-industry standard deviations of labor productivity and of total factor productivity (TFP) and the Olley-Pakes (OP) measure of the covariance between labor productivity and employment shares within industry based on Olley and Pakes (1996).¹⁰¹¹ One of the main hypothesis is that resource reallocation from low productivity firms to higher productivity ones is driven by industry dynamics reflecting heterogeneity in firm-level performance within defined industries. This reflects the normal dynamic process by which successful firms within an industry tend to grow and their less successful competitors tend to shrink—at least this is what would happen without government interventions such as lending to weaker firms. Therefore, measures of the dispersion of firm performance could serve as important indicators for allocative efficiency. The first two indicators measure within-industry dispersion of firm performance as measured by labor productivity and TFP, respectively. An assumption embedded in these indicators follows the literature on firm size distribution (see, e.g., Lucas Jr (1978); Melitz

¹⁰Following existing literature (see, e.g., Foster, Haltiwanger, and Syverson (2008) and Melitz and Polanec (2012) and Banerjee and Moll (2010) and Bartelsman, Haltiwanger, and Scarpetta (2013)), we define two-digit industry as base industry. Moreover, due to the inconsistency and various change in the definition of industry code in our data, it is more safe for us to use two-digit industry code.

¹¹Following the definition of Foster, Haltiwanger, and Syverson (2008) and Bartelsman, Haltiwanger, and Scarpetta (2013), we obtain TFP as a regression residual of firm-level production function regression:

$$\ln TFP = \ln Y_{i,t} - \hat{\alpha} \ln K_{i,t} - \hat{\beta} \ln L_{i,t},$$

where $Y_{i,t}$, $K_{i,t}$ and $L_{i,t}$ is the real value added, real capital input, and employment of firm i in period t , and $\hat{\alpha}$ and $\hat{\beta}$ denote the estimates of regression coefficients for capital and labor inputs. As always, we include two-digit industry dummies and year dummies in our production function regressions. Though Petrin and Levinsohn (2012) pointed out the advantage of value-added production function over gross output production function as the former method yields a much more direct welfare interpretation, we still examine gross output in the production function to calculate TFP and find the pattern robust to this alternative measure for different firm ownership. Detailed results are available upon request.

(2003); Maksimovic, Phillips, and Prabhala (2011)), that there is a positive correlation between firm performance and size. The reasoning behind this is that more productive firms tend to be larger because their bigger size is either the result of being more productive or because they are more able to absorb resources, for example, such as technological advances. A host of cross country research efforts have investigated this assumption. A key paper by Bartelsman, Haltiwanger, and Scarpetta (2013), for example, emphasizes the impact of idiosyncratic distortions at the firm level on the difference in allocative efficiency across countries. China might offer a example of a distortion on allocative efficiency across industries, since many SOEs grew to be large not because of market competition but rather based on government policies. If that is the case, the allocative efficiency shown by the Olley-Pakes covariance might not be actually efficient.

The OP covariance is originally from is Olley and Pakes (1996) where they proposed a cross-sectional decomposition of industry-level productivity defined as an index calculated as follows:

$$\bar{a}_t^s = \bar{a}_t + \sum_{i=1}^{n_t} (S_{i,t} - \bar{S}_t)(a_{i,t} - \bar{a}_t)$$

where \bar{a}_t^s represents the share-weighted average index for the productivity of a defined industry, $a_{i,t}$ is the productivity for firm i in period t and $S_{i,t}$ is the share of activity for firm i . The shares for all variables are weighted using the size of firms based on sales. Variables with a bar indicates the unweighted average of the firm-level measures. For example, \bar{a}_t is the unweighted average of firm productivity calculated as $\bar{a}_t = n^{-1} \sum_{i=1}^n a_{i,t}$. The formula of industry productivity index consists

of two terms: the unweighted average of firm productivity \bar{a}_t and a covariance term between productivity and the employment or labor shares. The second term, the OP covariance from Bartelsman, Haltiwanger, and Scarpetta (2013), is the measure of allocative efficiency on which this paper focuses. A positive covariance indicates that firms with higher than average productivity tend to have above-average market share, and firms with lower than average productivity tend to have below-average market share. This process in principle would be expected to lead to efficient resource allocations.¹²

Figure 2.3 and Figure 2.4 map the values of the first two allocative efficiency measurement variables, the within-industry standard deviations of labor productivity and of TFP respectively. According to Bartelsman, Haltiwanger, and Scarpetta (2013) and Hsieh and Klenow (2009), a higher level of dispersion of firm productivity is associated with a higher level of resource misallocation because of the higher level of heterogeneity in firm production functions. As shown in Figure 2.1 and Figure 2.2, regions with a lower share of SOEs tend to be those coastal areas where there are more firms of all ownership types with annual sales higher than 5 million RMB (and thus ample numbers of non-SOEs big enough to be counted in the annual survey). Interestingly, the pictures shown by Figure 2.3 and Figure 2.4 is similar to Figure 2.2, indicating that coastal provinces have lower level of dispersion in labor productivity and TFP compared with the rest of provinces, and thus have better resource allocation.¹³ It is interesting to note that the dispersion measures for the

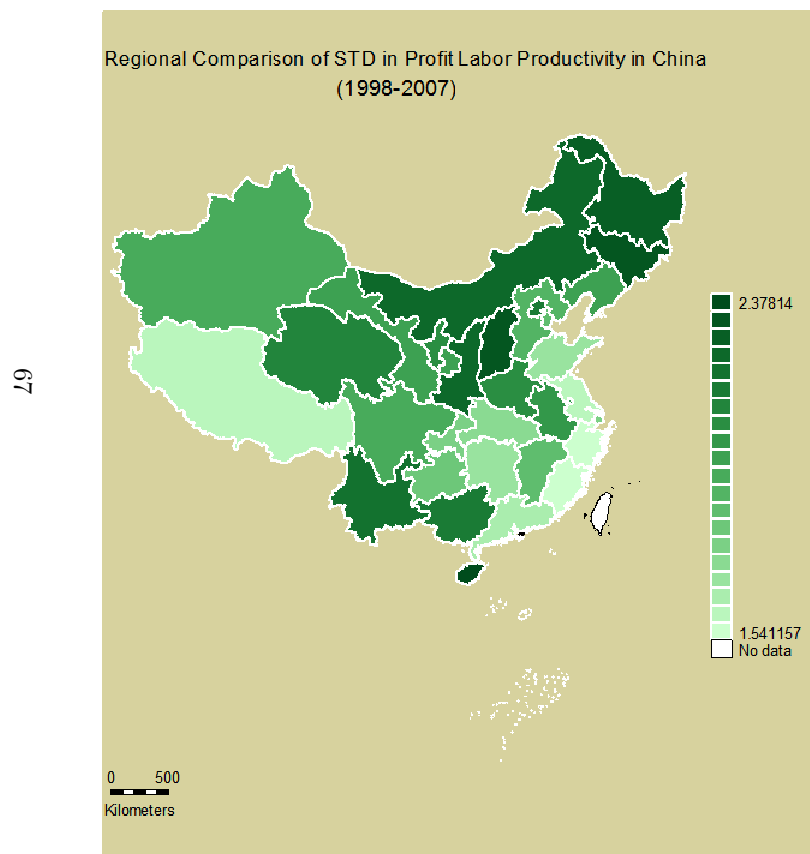
¹²We define firm labor productivity as log profit per employee at the firm level for $a_{i,t}$. For market share measurement, we follow Bartelsman, Haltiwanger, and Scarpetta (2013)'s way by defining labor share in the industry for $S_{i,t}$. However, we have also used log value added per employee at the firm level for $a_{i,t}$ and the sales for $S_{i,t}$, respectively. The results are generally robust and available upon request.

¹³We define coastal areas as Hebei, Liaoning, Beijing, Shandong, Jiangsu, Zhejiang, Fujian, Guangdong, and Hainan, all of which have benefited from their location and policy priorities in the process of reform and opening-up. This definition is not consistent with the distribution shown in Figure 2.1, Figure 2.2, Figure 2.3 and Figure 2.4, but

three Northeastern provinces of Heilongjiang, Jilin and Liaoning are more similar to Middle and Western provinces than to coastal regions though they are usually considered as eastern provinces. This is probably because those provinces used to be the main destinations for state investments before economic reform and thus have a higher presence of SOEs, and thus a greater degree of inefficiency of resource misallocation.

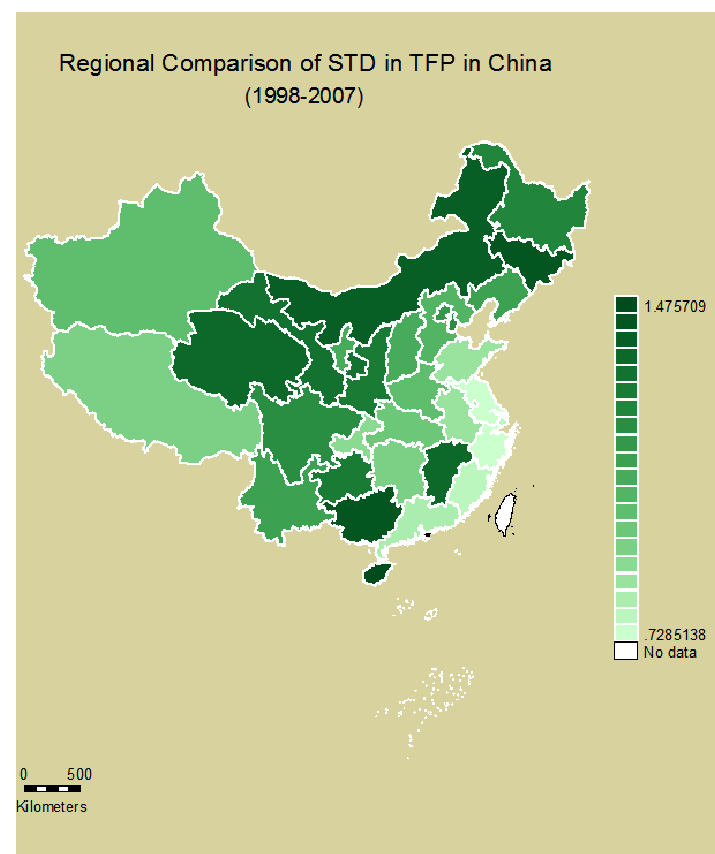
is also based on the index marketization index proposed by Wang, Fan, and Zhu (2007). They find that coastal areas have higher level of marketization above 6.0 while other provinces are usually lower than 6.0. There is an exception, though, Sichuan whose index is close to some coastal provinces. This is also evident in our figures that Sichuan's dispersion is more like coastal regions than their Middle or Western provinces.

Figure 2.3: Regional Comparison of S.D. in Profit Labor Productivity in China



Source: Author's mapping using CASMF.

Figure 2.4: Regional Comparison of S.D. in TFP in China



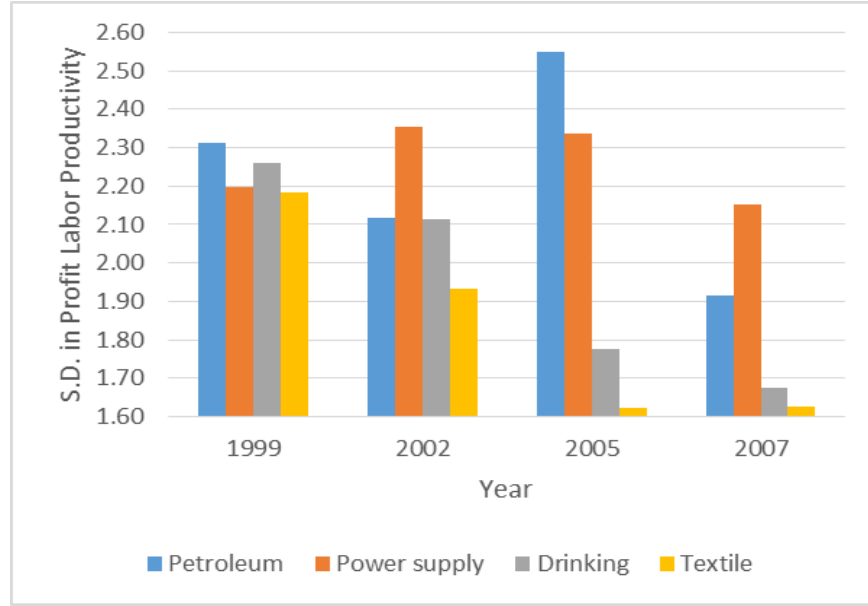
Source: Author's mapping using CASMF.

Figures 2.5, 2.6 and 2.7 provide further summary statistics for the dispersion measures across industries over time. The focus is on the four industries of petroleum, power supply, beverage and textile as a way to examine the SOE reform policy of “Grasp the Big, Let Go of the Small.” Firms in both power supply and petroleum industry including related areas such as petroleum processing are listed as strategic industries that require tight control of the government and have a higher entry barrier for non-government firms. In contrast, beverage and textile industries are categorized by both central and local governments as areas in which it is acceptable to have market competition, so that private firms have almost no entry barrier. The figures thus show two industries that are “grasped” and two that are “let go.” Figure 2.5 shows the time trend for within-industry standard deviations of labor productivity measured by profit per employee for these four industries.¹⁴ The general dispersion of the four industries has become much less wide over the period from 1999 to 2007, indicating an improvement in resource allocation. However, the decrease in standard deviation for petroleum industry and power supply is much less than that of the textile and beverage industries. All four industries share basically the same dispersion in 1999, whereas in 2007 the textile industry has at least 15 percent lower standard deviation than the petroleum industry and around 30 percent lower than power supply industry. A natural explanation is that the resource misallocation in beverages and textiles have improved much more than for power and petroleum because SOEs in the first two industries confront more competition from entrants including private and perhaps foreign or Macau-Hong Kong-Taiwan companies. The picture is generally the same for the within-industry standard deviation of log total

¹⁴We also have information for the rest of years between 1998 to 2007. However, we only picked 1999, 2002, 2005 and 2007 for the purpose of being more readable meanwhile not to compromise the main time trend.

factor productivity shown in Figure 2.6. The total dispersion has become narrower over the time period though the evolution is not as dramatic as with the measure for profit labor productivity in Figure 2.5. The one with the most significant decrease or improvement in allocative efficiency is understandably the textile industry, which can be explained by the fact that the competition is fierce in this industry, especially after China joined the WTO and opened the sector to competition and entry. By the end of the data period, textiles has among the lowest share of SOEs of an industry. Comparatively speaking, the allocative efficiency of the beverage industry is getting better at a more gradual pace, with less than 10 percent improvement. Interestingly, however, the dispersion of petroleum industry has actually become much wider between 1999 to 2007, especially for 2002 and 2005 when there were a spike, indicating that resource allocative efficiency might be getting worse. Figure 2.7 illustrates the dispersion of the OP covariance in firm productivity. The general picture is the same as Figure 2.5 and Figure 2.6, with average dispersion become steadily narrower, from negative to positive, and thus apparently better allocative efficiency. Interestingly, the OP covariance of three out of four industries is negative in 1999 while only one is negative in 2007. The only one remaining negative all the time is power supply, while improving gently, indicating consistent allocative inefficiency remain. The only one industry in which the measure of allocative efficiency is positive and shows a continuous gain is beverages. The OP covariance of both petroleum industry and textile industry turned from negative to positive, indicating a significant improvement in resource allocation though the extent of the improvement in petroleum is not nearly as much as in textiles. To sum up, the three moments of dispersion measurement generally indicate that industries with greater government involvement such as petroleum

Figure 2.5: S.D. in Profit Labor Productivity among Industries over Years



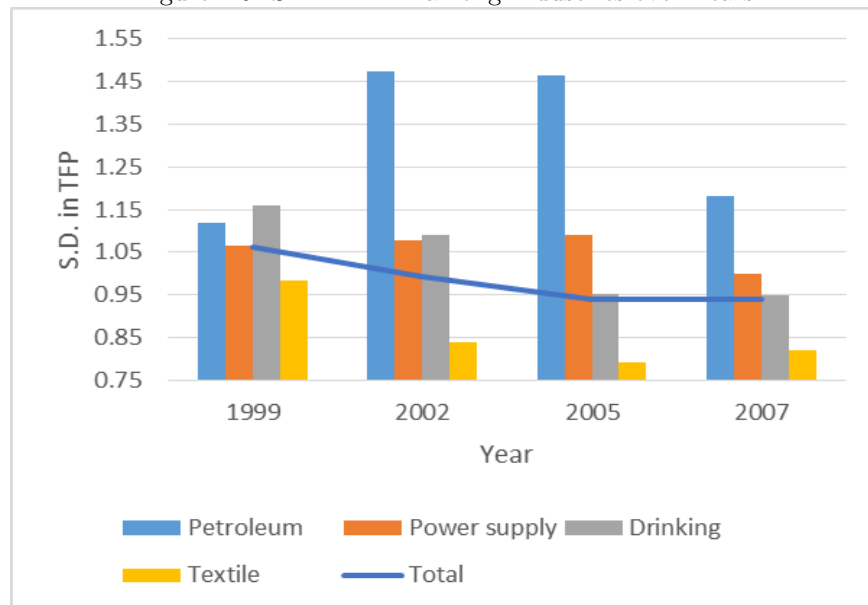
Source: Author's calculation using CASMF.

and power supply have lower allocative efficiency than those with less government involvement and more intense competition.

Figure 2.8 makes a cross country comparison for the within-industry standard deviations of TFP and OP covariance. Information on other countries are from Hsieh and Klenow (2009) and Bartelsman, Haltiwanger, and Scarpetta (2013).¹⁵ China generally has a much wider dispersion compared with industrialized countries for both standard deviations of TFP and OP covariance. For standard deviations of TFP, China is ahead only of India and close to Hungary, suggesting that there remains considerable scope for contributions to potential economic growth by improving al-

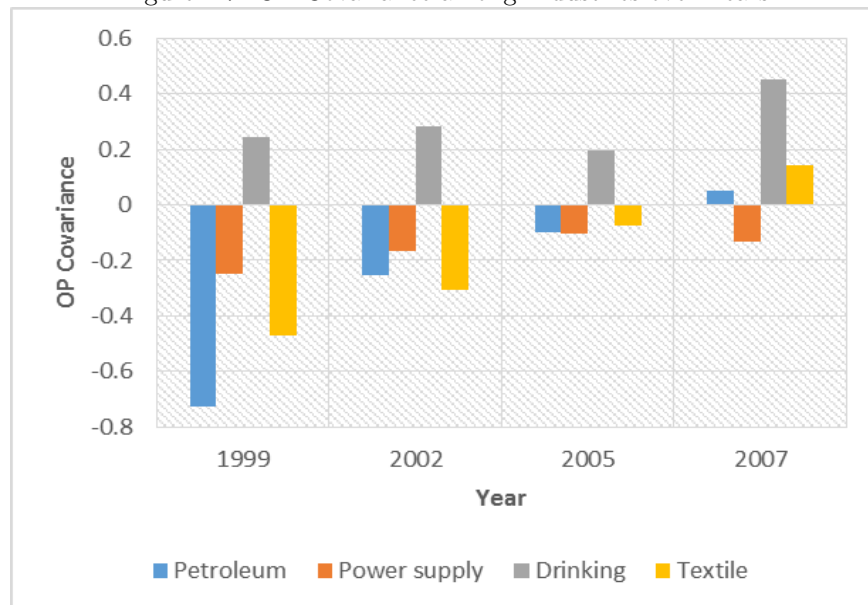
¹⁵The information on United States, France and Netherlands are the averaged value over 1993-2003 from Bartelsman, Haltiwanger, and Scarpetta (2013). The data on India is in 1994 which is most recent one in the table by Hsieh and Klenow (2009). We have also compared our calculation with Hsieh and Klenow (2009) since we are using the same data. We find our results almost the same as theirs.

Figure 2.6: S.D. in TFP among Industries over Years



Source: Author's calculation using CASMF.

Figure 2.7: OP Covariance among Industries over Years

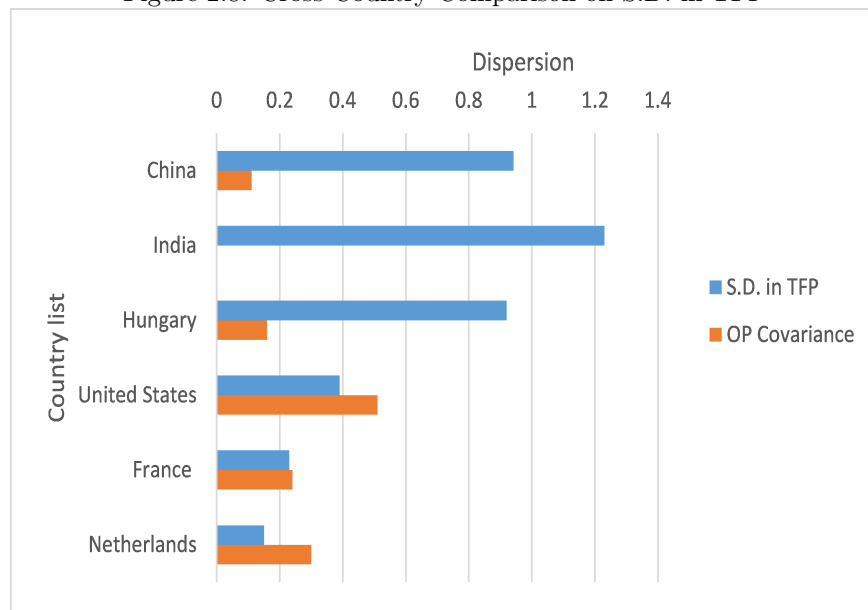


Source: Author's calculation using CASMF.

locative inefficiency within China. It is the same case for OP covariance. Information on India is missing, but China's covariance value, 0.11, is even lower than that of Hungary and much lower than that of United States (0.51) and continental Western European countries such as France (0.24) and Netherlands (0.30) respectively. Even with China's spectacular economic growth over the past three decades, the data summary alone indicates that substantial resource misallocation still exists in the Chinese economy. This implies that if China's allocative efficiency could reach the level of industrialized countries, there is still great potential for sustained long term economic growth. And these results cover only manufacturing. It would be interesting to carry out a similar exercise for the service sector once those data eventually become available.

The data suggest that China is on average improving in allocative efficiency over time, especially for industries with less government involvement. We examine further an important driving force for this change—the degree of competition from firms that are not government-owned. Figure 2.9, Figure 2.10 and Figure 2.11 illustrate the three moments for measurement in dispersion over 1999 to 2007: the within-industry standard deviations of labor productivity and of TFP and OP covariance. In Figure 2.9, almost all firms experienced gains in allocative efficiency, but SOEs consistently have much wider dispersion and thus less efficiency than the rest of firms. Domestic private firms had the most significant gains in allocative efficiency, improving by more than 15 percent over the period. The picture is generally the same for the dispersion of TFP as shown in Figure 2.10. The dispersion of SOEs consistently is consistently the widest and did not change too much over the period,

Figure 2.8: Cross Country Comparison on S.D. in TFP



Sources: The data on China is in 2007 from author's calculation using CAsMF. India data is in 1994 from Hsieh and Klenow (2009). The rest countries are from Bartelsman, Haltiwanger, and Scarpetta (2013) averaged between 1993 and 2001.

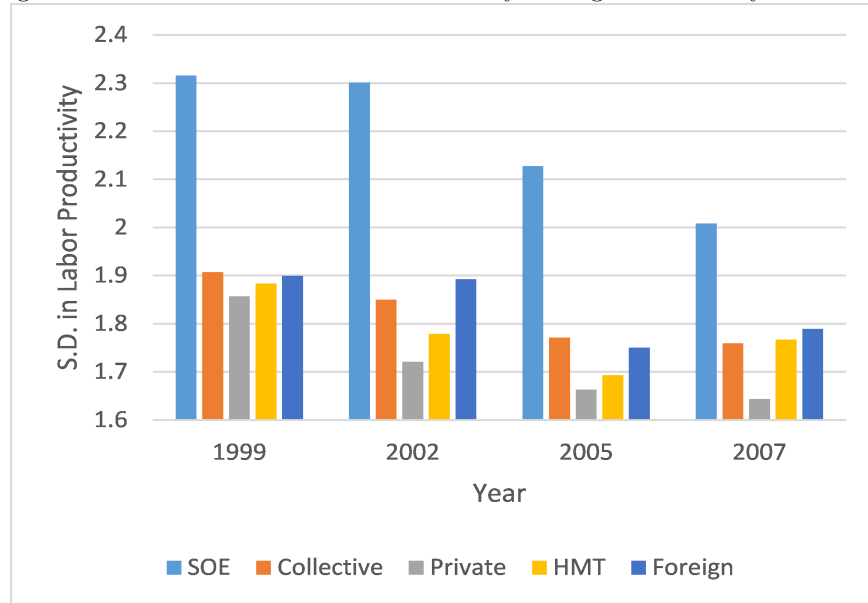
indicating little improvement in resource efficiency. Domestic private firms have the best resource allocative efficiency, even though there is little change between 1999 to 2007. Interestingly, the dispersion of allocative efficiency for collective firms is actually getting wider and probably less efficient. Both foreign and HMT firms seem experienced an even more gentle gain in resource allocation. The OP covariance is also basically the same case. Overall, all types of firms have experienced improvement in allocative efficiency from negative to positive. Foreign companies appears have had the most significant gains, improving by more than 80 percent from 1999 to 2007. Whereas SOEs also gained more efficiency in allocation, their improvement is the least substantial. All other types of firms generally had a steady improvement in allocative efficiency. Looking across all three moments of allocative efficiency by the different types of ownership categories, SOEs lagged behind other types of firms in the improvement of allocative efficiency.

2.3 Empirical strategy

2.3.1 Firm level evidence

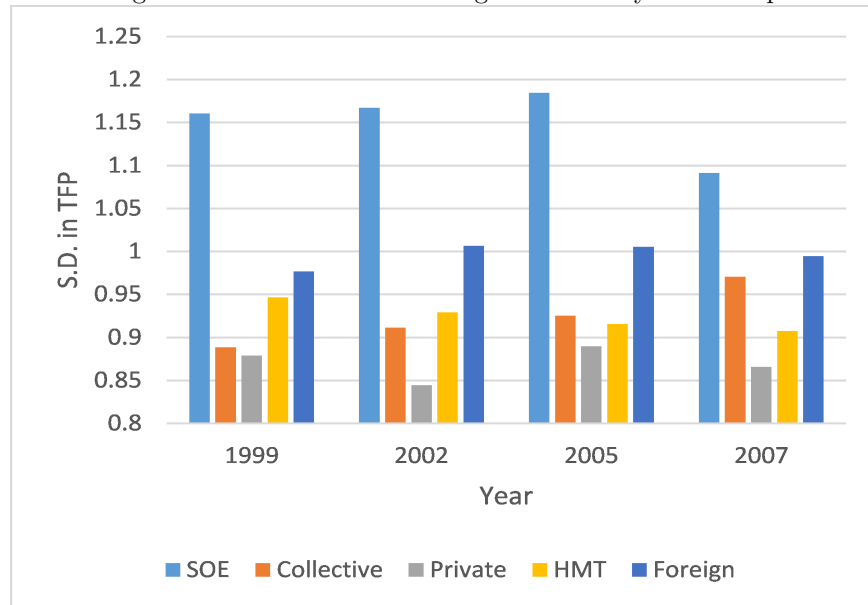
The next step is to gauge the efficiency of firms within each sector. A direct way to measure whether a firm is efficient is to compare it with other firms in the same industry, including to compare between state-owned enterprises and other ownership types such as private firms, collectives, and firms owned by foreigners or residents of Hong Kong, Macau, and Taiwan. Therefore, we take a direct approach to define the

Figure 2.9: S.D. in Profit Labor Productivity among Industries by Ownership



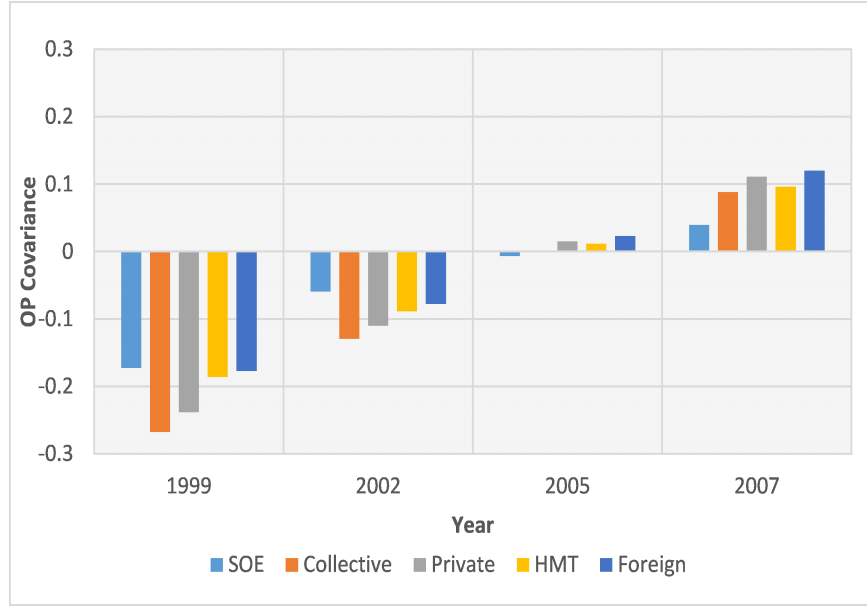
Source: Author's calculation using CASMF.

Figure 2.10: S.D. in TFP among Industries by Ownership



Source: Author's calculation using CASMF.

Figure 2.11: OP covariance among Industries by Ownership



Source: Author's calculation using CASMF.

allocative efficiency at a firm level as the Olley-Pakes covariance. This will be used to assess the impact of ownership status—namely of SOEs—on the allocative efficiency for firms.

As such, we firstly employ a reduced-form equation to identify the correlation at the firm level:

$$(S_{i,t} - \bar{S}_t)(a_{i,t} - \bar{a}_t) = \alpha + \beta_1 OWNERSHIP_{i,t} + \delta FIRM_{i,t} + \varepsilon_{i,t} \quad (2.1)$$

where the dependent variable, $(S_{i,t} - \bar{S}_t)(a_{i,t} - \bar{a}_t)$, is the OP covariance. A positive covariance for firm i means that this firm's performance is above the industry

average with an above-average market share, indicating an efficient resource allocation for firm i . *FIRM* is a vector of firm-specific control variables, including firm performance measured by return on equity (ROE) and the value of firm exports. *OWNERSHIP* is a categorical variable for ownership with state-owned firm as the default.

Table 2.2 reports the regression results for specification (1). Column (1) is the regression without the ownership indicator, column (2) provides results with ownership only and column (3) shows the results for specification (1) adding firm-specific characteristics. As expected, the coefficients on all types of ownership are significantly positive except for collective firms, suggesting that SOEs have the second worst outcome for the efficiency of resource allocation. Domestic private firms have the best allocative efficiency as shown by the largest value of coefficient, followed by HMT firms. Interestingly, the coefficient on foreign firms in both column (2) and (3) are negative but not statistically significant, indicating no difference in allocative efficiency compared to SOEs. Other control variables are generally as expected. Firms with higher exports tend to higher allocative efficiency than non-exporters. This accords with the literature on the exceptional performance of U.S. exporters (Bernard and Jensen, 2004), but contrasts with Lu (2012)’s argument that other export Chinese firms are less competitive.

2.3.2 Within-industry evidence

One major shortcoming of firm-level regression is that it is hard to tease out the

Table 2.2: Olley-Pakes Allocative Efficiency and Firm Ownership

	(1)	(2)	(3)
Domestic Collective Firms		-0.0137*** (0.0015)	-0.0121*** (0.0017)
Domestic Private Firms		0.0055*** (0.0015)	0.0059*** (0.0016)
HMT Firms		0.0042** (0.0022)	0.0049*** (0.0024)
Foreign Firms		-0.0002 (0.0021)	-0.0005 (0.0024)
Log Export	0.0008*** (0.0001)		0.0008*** (0.0001)
ROE	0.0020*** (0.0002)		0.0020*** (0.0002)
Firm Fixed Effects	Yes	Yes	Yes
Province Dummies	Yes	Yes	Yes
Number of Observations	559556	674033	558303

Notes: * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Robust asymptotic standard errors reported in parentheses are clustered at the firm level and reported in parentheses. Sample period is from 1998 to 2007 at an annual frequency. The dependent variable in all specifications is OP covariance, $(S_{i,t} - \bar{S}_t)(a_{i,t} - \bar{a}_t)$. All specifications include time fixed effects and firm fixed effects. ROE indicates return on equity. Export variable is continuous value in thousand RMB. R-squares for specification (1), (2) and (3) are 0.2870, 0.0054, and 0.3044, respectively.

impact of industry market power on allocative efficiency, and most importantly to assess how market power interacts with firm ownership to affect resource allocation. It could be, for example, that the most concentrated industries are not the most productive ones. It might also be the case that industries in which relatively large firms possess market power reflect the impact of China’s “Grasp the Big, Let Go of the Small” industrial policy rather than market forces.

We explore further this interesting question from the industry level by estimating a regression specification as follows:

$$Y_{j,t} = \alpha + \beta_1 HHI_{j,t} + \beta_2 OWNERSHIP_{j,t} + \beta_3 HHI_{j,t} * OWNERSHIP_{j,t} + \delta FIRM_{i,t} + \varepsilon_{j,t} \quad (2.2)$$

where $Y_{j,t}$ represents the two dispersion measurements for industry j in time period t , the within-industry standard deviations of labor productivity and of total factor productivity (TFP). $HHI_{j,t}$ is the Herfindahl-Hirschman Index (HHI) for industry j in time t to measure market concentration of industry j . $OWNERSHIP_{j,t}$ represents the firm number share for each type of firm in industry j in time t . $HHI_{j,t} * OWNERSHIP_{j,t}$ is an interaction term that captures the interactions of industry concentration with the share of ownership to affect industry resource allocative efficiency.¹⁶ $FIRM$ is a vector of firm-specific control variables, including firm

¹⁶This is the Herfindahl-Hirschmann index of concentration, adapted to this purpose. The measurement index in Table 2.4 is the sum of squared shares of each firm’s sales in its two-digit industry in each specific year. The mathematical form is expressed as $HHI = \sum_{i=1}^n MS_i^2$, where MS_i is the market share, measured here by firm sales, of i th firm in an industry comprising n firms. Higher values indicates that a fewer firms account for a large share of the market power, measured by sales, in its industry. For robustness purpose, we also experimented the calculation of HHI index by total assets and find the pattern quite robust. Detailed results are available upon request.

performance measured by return on equity (ROE), firm exports, and the firm age (since one might expect young firms to have different productivity measures than long-established ones). This specification will thus shed light on both the impact of concentration of allocative efficiency and whether this impact relates to the shares of SOEs vs. other types of firms in an industry. Specification (2) is first estimated using industry fixed effects and then using the first-difference Generalized Method of Moments (GMM) estimation procedure for panel data.¹⁷

Table 2.3 shows the regression results for specification (2). The first two columns show results for the regression using the measure of allocative efficiency based on the within-industry (two digits) standard deviation in log labor productivity using fixed effects and GMM estimation. The latter two columns show the equivalent regression using the measure of allocative efficiency based on log TFP. The main difference from Table 2.2 is the definition of ownership using a continuous variable for the SOE share rather than ownership dummy variables in Table 2.3. The coefficients on the SOE share are significantly positive, indicating that industries with higher SOE shares tend to have wider dispersion and thus less allocative efficiency. This is quite robust to the selection of the dependent variable and the estimation method.

¹⁷To obtain consistent estimates of specification (2), we use Arellano and Bond (1991a)'s first-difference Generalized Method of Moments (GMM) estimation for the dynamic specification. However, for difference GMM estimator to be valid, consistent and efficient, two critical assumptions must be satisfied. First, regressors must be predetermined by at least one period, which is hard to test with existing econometric tools. Second, the error terms should not be serially correlated (Arellano and Bond, 1991b; Forbes, 2000). For the first assumption, we simply use the lagged value as the respective instruments of those potential endogenous variables. To test the second assumption, we firstly make Sagan/Hansen test, which is used for overidentifying restrictions. Under the null hypothesis of instrument validity, the asymptotically distribution can serve as chi-square test where the degrees of freedom is the number of instruments less the number of parameters. The alternative method is to make first-order and second-order serial correlation test. We report the results of these two tests in the regression tables. Following Gilchrist and Himmelberg (1995) and Forbes (2000), we use two period lagged value as instruments for endogenous regressors. One main reason for us to choose $t - 2$ as instruments is that it passed the Sagan/Hansen J test for volatility and Arellano-Bond test for autocorrelation test while not risking losing too many observations.

Table 2.3: Allocative Efficiency by With-in Industry S.D. and Firm Ownership

	S.D. in Labor Productivity		S.D. in TFP	
	FE	GMM	FE	GMM
SOE Share	0.7451*** (0.2125)	0.7704** (0.3748)	0.4359*** (0.1607)	0.3202* (0.1697)
HHI Index	2.7344*** (0.6314)	0.0752 (0.9796)	-0.3267 (0.5026)	-0.3472 (0.2949)
SOE*HHI	1.9762*** (0.7068)	1.7165* (0.9016)	1.2277** (0.5542)	0.9025*** (0.2949)
Firm Age	-0.0500*** (0.0042)	-0.0486*** (0.0089)	-0.0441*** (0.0030)	-0.0413*** (0.0099)
Export	-0.0660*** (0.0159)	-0.0474** (0.0022)	-0.0200 (0.0127)	-0.0821 (0.0581)
ROE	-1.3182*** (0.0511)	-0.0594*** (0.0021)	-0.5811*** (0.0408)	-0.6229*** (0.1316)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Number of Observations	350	307	337	274

Notes: * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Robust asymptotic standard errors reported in parentheses are clustered at the industry level and reported in parentheses. Sample period is from 1998 to 2007 at an annual frequency. All specifications include time fixed effects and firm fixed effects. ROE indicates return on equity. Export variable is continuous value in thousand RMB. The GMM estimation is by first-difference specification with instruments $\log(Y_{j,t-2})$. The lagged investment variables are not reported here since the fixed effects estimations don't include dynamic specification. However, the coefficients of lagged investment variables are both positively significant. The P-value for Sagan/Hansen J test in specification (2) and (4) are 20% and 13% respectively, indicating no significant problems identified since the estimation cannot reject the null hypothesis of instruments validity. The P-value for second-order serial correlation test, Arrellano-Bond test, in specification (2) and (4) are 22% and 18%, respectively, showing that the null hypothesis of no autocorrelation cannot be rejected. Therefore, no serious problems with specifications and estimations were found based on our tests. We have also done sensitive analysis for lagged value of three years and the patterns are generally the same.

The coefficients on HHI measure are also significantly positive, suggesting that industries with higher market concentration are actually less efficient.¹⁸ This leads to a natural question regarding the interaction of market concentration and ownership in affecting allocative efficiency. Table 2.3 suggest that the coefficients on the interaction term between the SOE share and the indicator of market concentration (HHI index) are significantly positive for both log profit labor productivity and TFP, whether estimated using GMM or fixed effects. This suggests a connection between these two factors: that industries with higher market concentration reflect the higher share of state-owned firms, and this ultimately leads to less allocative efficiency. Moreover, this pattern is consistent with the SOE reform policy of “Grasp the Big, and Let Go of the Small” in that government policy explicitly seeks to foster dominant state-owned firms in selected industries. The results here indicate that these are the industries in which there is relatively higher allocative inefficiency as measured by the dispersion of either labor productivity or total factor productivity. The implication in both cases is that the policy of supporting SOEs leads to inefficient and concentrated industries.

2.4 Conclusions

This paper sheds light on the impact of firm ownership, mainly SOEs, on allocative efficiency. We employ three allocative efficiency measurements: the standard

¹⁸Here we don’t include the table that exclude ownership variable. However, the coefficient and signs are almost the same as what reported in Table 2.3.

deviation in labor productivity, standard deviation in log TFP and the Olley-Pakes covariance. The results indicate that ownership of a firm by a level of the Chinese government is associated with significantly less efficient resource allocation than other types of ownership such as private and foreign-owned companies. This observation is also robust to within-industry evidence after we collapse firm level data into industry and year data. The results are consistent with an impact on allocative efficiency of the “Grasp the Large, Let Go of the Small” SOE reform policy. Industries with higher market concentration have worse allocative efficiency, suggesting the impact of SOE reform policy rather than market forces. A future reform that fosters increased productivity in these sectors, perhaps by bringing additional competitive forces to bear on now-sheltered SOEs, has the potential to improve productivity growth in China, and thereby to sustain strong growth in the Chinese economy.

Chapter 3

Financial Reform in China

3.1 Introduction

The Chinese financial system has grown tremendously with China's spectacular development over the past thirty years, but still needs considerable reform to support further economic growth. In a seeming paradox, the Chinese financial system would benefit from the combination of less regulation but more supervision—less regulation so that private incentives and competition allocate capital and thereby improve efficiency and growth, but more supervision to rein in risk-taking that relies on an implicit government backstop. The necessary reforms include both domestic measures to improve the safety and soundness of Chinese financial institutions, and international ones to open the Chinese economy to global financial flows and allow for a market-determined exchange rate. The ultimate goal of reform is to establish a financial sector that serves as an effective intermediary between the massive savings of

Chinese families and the burgeoning financial needs of consumers and businesses in a China's rapidly growing and evolving economy. While improving economic efficiency, reform in China should also address the safety and stability of the financial sector, notably to ensure that private market participants rather than the government takes on the risks of investment and lending, while public sector involvement is transparent and accounted for in the budget.

The Chinese financial system is both dominated by five massive state-owned banks, with a multitude of smaller institutions that are again mostly controlled by various parts of the public sector. Directives from these multiple levels of government heavily influence the allocation of bank loans, giving rise to attendant concerns over the quality of lending and the efficiency with which the Chinese financial system allocates capital. Financial markets, including the capital market and money market, are relatively small relative to GDP, and provide a modest share of total social financing compared to advanced economies. For example, Chinese banks holds \$20 trillion of total assets in 2012, compared with \$13 trillion in the United States; three times China's GDP versus one times annual GDP in U.S. Due to the halt of IPO, financing through equity market makes up 1 percent of total social financing in 2012. The market capitalization has been shrinking from around 100 percent to 58 percent over 2009 to 2013, which makes firms even harder to receive money from equity market.¹

The pervasive state ownership of banks means that credit allocation and public debt are linked in China—deposits and other sources of bank funding are effectively guaranteed (even if not formally), so that the risks of bad lending ultimately fall to the

¹The data sources are World Bank's Market capitalization of listed companies and PBOC website on total social financing.

public sector (Dollar and Wei, 2007). As have shown by the Chapter 1 and Chapter 2, the preferential access to financial system by SOE has affected firm investment behavior, and to be associated with inefficient resource allocation in the Chinese economy between 1998 and 2007. However, since the global Great Recession in 2008, Chinese government units at both the central and local levels have invested even more massively and aggressively as a mechanism to boost the economy and maintain job creation. This activity has been mainly financed by state-owned banks, both central and local governments, typically with land as the collateral. The failure of these investment projects to generate adequate returns to service the debt would thus put banks at risk—but the directed nature of the lending makes it likely that this will be the case.

At the same time, financial repression in China leaves families with a limited choice of options through which to save—generally bank deposits or other products sold through banks cash (“under the pillow”), and real estate. The low interest rates on deposits contributes to a massive diversion of resources into real estate and possibly a real estate bubble, along with flows of savings into poorly-regulated investment trusts. De facto guarantees on household saving in turn put the public sector at risk.

China is liberalizing the banking sector to allow more flexibility of interest rates and competition among banks. Success on this reform effort would improve the quality of lending and thus contribute to more stable and sustainable growth, while failure to move forward ultimately could threaten macroeconomic stability if financial sector losses threaten consumer and business confidence or even public sector finances. These risks look to be low for now, in part because the Chinese govern-

ment has the ability to absorb the built-up losses in the financial sector reflecting past bad loans using its \$4 to 5 trillion of foreign reserves—these are effectively assets that can be used to cover losses without resorting to additional taxation, borrowing, or inflationary financing. Still, a key element in reform will be to ensure that problems in the financial do not recur—that the need to burn Chinese reserves to cover losses is a one-off solution. This is the key challenge, since the embedded losses exist and the attendant losses must be covered. Getting this reform right will be a key to future Chinese economic growth.

Reform of China's regimes for international capital flows and exchange rates eventually must be part of a successful financial sector reform. Indeed, opening up to global capital flows is one natural approach by which to improve the performance of Chinese financial institutions through the competitive pressure of foreign competitors—Chinese banks would be forced to improve if families could invest with American or European financial providers and if businesses could get loans or sell bonds through them. At the same time, the experience of other emerging market countries is that it is vital to ensure that domestic financial institutions are effectively regulated and supervised before opening up to global capital flows. This is a key lesson from the Asian financial crisis of the late 1990's, for example, in which financial institutions in countries such as Indonesia, Korea, and Thailand ran into trouble as international capital flooded into those countries as they liberalized.

There is thus a strong case for the continuation of capital controls in China until the Chinese financial sector is better able to intermediate potential capital flows (in both directions). It should be recognized, however, that these controls impose costs on the economy in terms of foregone investment and the inefficient allocation

of capital. The timing of domestic financial sector reform and international capital openness is thus a delicate balance. Slow movement on domestic reforms would prolong the period in which capital controls remain. An outright inability for reform to take place would necessitate leaving the controls in place.

There is thus a strong case for the continuation of capital controls in China until the Chinese financial sector is better able to intermediate potential capital flows (in both directions). It should be recognized, however, that these controls impose costs on the economy in terms of foregone investment and the inefficient allocation of capital. The timing of domestic financial sector reform and international capital openness is thus a delicate balance. Slow movement on domestic reforms would prolong the period in which capital controls remain. An outright inability for reform to take place would necessitate leaving the controls in place.

The structure of the remainder of the paper is as follows. Section 3.2 provides background information on China's financial system and past financial reforms. Section 3.3 documents the recent reform measures, while Section 4 analyzes risks and challenges for macro stability, and policy proposals. Section 5 contains concluding remarks.

3.2 Background information and history

China's financial system before 1949, was relatively well developed among Asia countries. Shanghai was the largest international financial center in the Far East with 28 foreign bank offices, 58 headquarters of domestic banks and 182 branches (Yatsko,

2000). Financial markets were also well developed, with the Shanghai Stock Exchange the third largest in the world after London and New York. The loss of China's financial prowess was keenly felt once policymakers turned in the market-oriented direction starting in the late 1970's. As Deng Xiaoping pointed out in 1992 during his trip to Shanghai: "...Shanghai used to be a financial center where people exchanged currency freely...". China's domestic social capital, mainly based on kinship and family ties, independent of formal merchant law, greatly contributed to the development of financial institutions and markets Kirby (1995).²

China's financial system shriveled between 1949 and 1978. Financial markets were disbanded, while the savings of both households and firms were obligated to take the form of products and commodities, instead of cash, allowed by the Planning Bureau at central and regional levels. The People's Bank of China (PBOC) was the sole financial institution in the country, operating under the management of the Ministry of Finance and responsible for both central banking and for the equivalent of commercial banking operations. Its main role was to finance fixed asset investment by the government, including through a system of "united-deposits" and "united-lending", no interest payment involved for any transaction since both saver and lender is central government.³

Major reforms were initiated in the 1980s for financial institutions. The PBOC was separated from the Ministry of Finance and several commercial banks were created, either on their own or from parts of the PBOC. Each of these state-owned banks

²For example, Goetzmann and Koll (2005) find that while China introduced the first Company law in 1904, it failed to transform China's traditional corporate governance. For more introduction and anecdotal evidence on the financial system prior to 1949, please refer to Allen, Qian, and Qian (2005); Franklin Allen and Qian (2008); Kirby (1995).

³For detailed information about China's financial system between 1949 to 1978, mainly the role of PBOC, please refer to website: <http://www.pbc.gov.cn:8080/publish/main/531/index.html>.

originally had distinct missions. The Industrial and Commercial Bank of China was tasked with lending to state industrial enterprises. China Construction Bank specialized in financing infrastructure projects and fixed capital assets. The Bank of China concentrated on financing of trade and international activities. China Agriculture Bank was involved with rural and agriculture-related lending—a function that meant that it had the most extensive branch network. The Bank of Communication provided money for transportation and communication ventures. Regional banks, typically owned by local governments, were formed to meet local financing needs. For example, Shenzhen Development Bank, a commercial bank originally owned by Shenzhen Municipal Government, was set up to finance the massive construction of the Shenzhen Special Economic Zone. In rural areas, a wide network of Rural Credit Cooperation was set up by county-level governments, with each branch typically under the supervision of the local Agriculture Bank. In 1986, the PBOC further authorized the establishment of Urban Credit Unions in cities (Park and Sehart, 2001). Other financial intermediaries, such as province-level Trust and Investment Corporations, were also created; some of these developed into large financial corporations such as Citic Group (formerly China International Trust and Investment Corporation).

Significant reforms in the financial system have been adopted since 1990. The most important was the introduction of financial markets, mainly stock exchanges, in Shanghai (SHSE) and Shenzhen (SZSE) in 1990. The Shanghai Futures Exchange was established in 1999. Meanwhile, more financial intermediaries with various forms were introduced. Other financial market participants such as asset management companies were established under government control and ownership. In addition,

several banks were established to undertake policy-related lending, notably the China Development Bank. The central government designated the PBOC as having the role of carrying out monetary policy while leaving many supervisory duties to two spin-off bureaus: the China Securities Regulatory Commission and the China Insurance Regulatory Commission.

An important set of reforms were put in place starting from 2000, driven in part by the experience of the late 1990's in which many state-owned enterprises experienced severe financial difficulties brought about by the financial crisis in other Asian countries. Non-performing debts accumulating dramatically after the 1997 Asia Financial Crisis, while SOE reforms starting around 1995 brought about a large number of bankruptcies of SOEs.

The opening up of the Chinese economy in the wake of the WTO entry brought concerns that more competitive foreign counterparts would enter into and dominate Chinese financial markets (fears that now seem unfounded but were real at the time). Therefore, Chinese government decide to reform the main financial intermediaries, the big State-owned banks, by forcing them to go public and to link with international partners to improve their management skills, even while the central government represented by Department of Treasury retained majority ownership. Meanwhile, the central government further spun off regulatory bureaus from the PBOC by establishing China Banking Regulatory Commission to regulate commercial banks. Financial markets, especially stock markets, developed, as both private firms and SOEs went public. For example, according to World Bank data set, the share of market capitalization to GDP has increased from 39.5 percent to 178.2 in 2007. Institutional investors became more dominant in stock market. Furthermore,

in 1998, the government liberalized the housing market by abandoning the planned allocation of housing to town residents and push the housing supply to market, leading a housing boom driven by bursting demand with prices of residences in major cities more than doubling between 2000 and 2008.

Liberalization allowed for a modest portfolio investment flows in both directions. In 2003, the Chinese government began to allow foreign institutions to invest in the domestic capital market through the program of Qualified Foreign Institutional Investors (QFII); while still modest, the amount grew to \$40 billion in 2013. The analogous Qualified Domestic Institutional Investors (QDII) allowed domestic investors to make portfolio investments in overseas markets starting in 2006, organized through designated Chinese securities companies. These outbound flows are likewise modest, rising to just over \$85 billion in 2013. Even with these developments, capital controls remain a central feature of Chinese financial markets policy, restricting both the ability of domestic savers from investing outside of China and of global investors from moving capital into China.

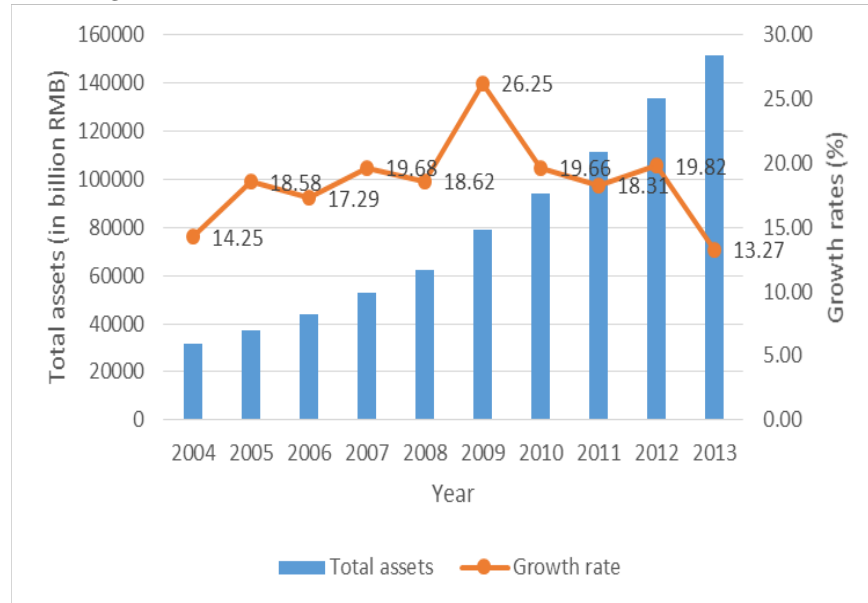
China's currency regime is closely connected to its monetary policy and to financial stability. The exchange rate peg throughout 1978 to 2005 and subsequent managed appreciation of the Renminbi has contributed to strong export-led growth but given rise to concerns regarding inflation, asset bubbles, and the threat to financial stability through bad lending by financial institutions awash with liquidity. Chinese government effectively creates RMB reserves with which to purchase dollar assets and thereby guide the value of the currency. This liquidity must then be absorbed throughout the Chinese economy. Inflationary pressures would result both directly from the liquidity growth and indirectly as the weak currency leads to

import price inflation. Abundant liquidity and financial repression likewise would generate concerns over the prices of assets that are open to Chinese households and firms, notably real estate.

China's foreign currency reserves soared starting from 2001, reflecting the combination of the huge trade surplus, capital controls, and official purchases of dollar assets such as Treasury bonds as part of the policy to stabilize the value of the Renminbi. Indeed, the pace at which China accumulates foreign currency reserves is often seen as a roughly concurrent indication of the extent of exchange rate intervention. China has allowed for increasing exchange rate movement over the past nine years, resulting in a mostly steady appreciation of the Renminbi (the currency was pegged during the financial crisis). There is no consensus as to whether the Chinese currency remains undervalued (Yongding, 2007). What is clear, however, is that in the past the Chinese government intervened heavily to maintain a weak RMB. The legacy of these past efforts continues to weigh heavily on Chinese banks and broader financial markets through the prodigious liquidity associated with China's currency intervention and the resulting growth in asset prices and associated lending.

The monetary policy associated with exchange rate management and the accumulation of foreign reserves has resulted in overall loose monetary conditions as seen in the large increase in the base money supply. The base money, M0, increased from 1 trillion RMB in January, 2000 to 5.8 trillion RMB in December, 2013. At the same time, loose money has generated aggressive lending by banks awash with deposits and under the direction of their owners—various levels of government—to support regional and national development by providing social financing. This can be seen in the rapid growth of bank assets (Figure 3.1) as lending accelerated from a 14 percent

Figure 3.1: Bank Assets and Growth Rates from 2004 to 2013



Source: CBRC, PBOC

growth rate in 2005 to nearly 20 percent in 2007 and 2008. This lending growth is especially remarkable since the exchange rate peg had been lifted in favor of a gradual appreciation and the higher rate of inflation in China than in the United States further implied an additional measure of real appreciation beyond the nominal; both of these would be expected to reduce the extent of liquidity creation driven by currency intervention and reserve accumulation.

While a full discussion of Chinese macro policy is beyond the scope of this paper, the monetary policy involved with ensuring continued export-led growth has brought about considerable financial risks, to be assessed below. Rising domestic inflation and international pressures resulted in a policy switch in July 2005 by which the Chinese

government allowed the RMB to appreciate, though at a gentle pace—roughly 20 percent in nominal terms from 2005 until the currency was again pegged during the financial crisis in 2008. Monetary policy has been subject to policy shifts from 2008 as the Chinese government has sought to alternately encourage loan growth to support the economy along with fiscal stimulus, and then to restrain lending to cool down a booming real estate market. The advent of the exchange rate regime also led to the creation of new institutions. The Chinese government established the China Investment Corporation (CIC) in 2007 to invest part of the foreign assets, while the State Administration of Foreign Exchange (SAFE) was partly separated from the PBOC in 2005 to serve as a specialized agency to manage foreign reserve holdings, though still under the broad management of the Central Bank. While many significant reforms in financial system were undertaken between 1978 and 2008, these were generally put in place in an incremental fashion, as exemplified by the creation of new regulatory bodies out of the functions of existing ones. In other cases, small-scale or localized experiments were undertaken to test liberalization, such as manageable incremental appreciate of RMB. At the same time, the spectacular pace of growth in China and high return to capital effectively served to mitigate financial risks though Chinese government stripped off the bad loans and injected cash into the big four banks before they went to public during 2000s. At the same time, capital controls, while not airtight and involving costs, meant that China did not experience the rapid capital inflows and outflows that left other emerging market countries vulnerable to crisis. In a sense, capital controls functioned as a backstop for incomplete financial regulation, ensuring that a financial system not yet ready to effectively intermediate capital inflows would not have to do so.

3.3 Recent development

Macroeconomic policies have changed dramatically with the global business cycle since 2008, leaving China's financial sector more exposed to potential problems. The financial crisis in the United States and other nations was effectively a negative demand shock for China, whose economy relied heavily on export-driven growth. The Chinese government adopted a large-scale economic stimulus plan in response that combined expansionary fiscal and monetary policy. The PBOC, the Department of Treasury (the central government fiscal authority) and other branches of both central and local government together either spent directly or provided liquidity support for infrastructure investments estimated at 4 trillion RMB (roughly \$600 billion, or X percent of GDP). This has meant a considerable expansion of lending activity, beyond what might have been expected even with China's continued strong GDP growth. Financial market liberalization has continued in several dimensions, with some loosening of interest rate restrictions and modifications to the currency regime, even while capital controls remain largely in place. Recent developments have been driven by the expansion of internet commerce in China.

With the banking sector still the dominant component of China's financial system, the economic stimulus plan had a significant impact on bank balance sheets. Total banking assets in China rose more than five-fold in the ten years from 2004 to 2013. Overall bank assets expanded especially rapidly in 2009 to 2012, with 26 percent growth in 2009 driven by the four trillion RMB stimulus plan rolled out in 2009 under which banks were instructed to aggressively lend to local governments and firms, mainly SOEs. Bank asset growth slowed to "only" 13 percent growth in 2013

as the government sought to rein in credit creation to tamp down on asset price inflation—even the slow rate last year was considerably higher than the (nominal) GDP growth rate, indicating the degree to which Chinese growth relies on credit.

The slower growth of bank assets in 2013 likely reflects two developments in the Chinese financial system. The first is growth of credit provided by trust funds selling so-called wealth management products. These are deemed to be “shadow banks” since their activities usually are not on bank balance sheets—in a perverse echo of the U.S. financial crisis, however, it is likely that the funds will turn out to be implicitly guaranteed by the government in case households face losses. While it is hard to estimate the shadow banking size in China, we think it is safe to conjecture that a large proportion of the deceleration in bank asset growth could reflect the shift toward shadow banks for such “hidden” credit. The second reason is that an increasing number of firms and government entities have turned to bond markets for financing, though typically still in the form of short-term bond. This is discussed further below in the context of financial markets. A recent but still small development is the rise of so-called private banks that are not affiliated with the government; this is also discussed below.

It is interesting to note from a comparison of Figure 3.1 and Figure 3.2 that the volatility of asset growth is higher for state-controlled banks than for the overall banking sector. This likely reflects the use of these government-aligned lenders as instruments of macroeconomic policy, both as part of stimulus efforts and to cool down the economy at times. This was the case in 2004, for example, when asset growth was relatively low at state-owned banks, as these institutions reined in lending compared with banks that faced less political constraints. On the other side, asset

Figure 3.2: State-owned Bank Assets and Growth Rates

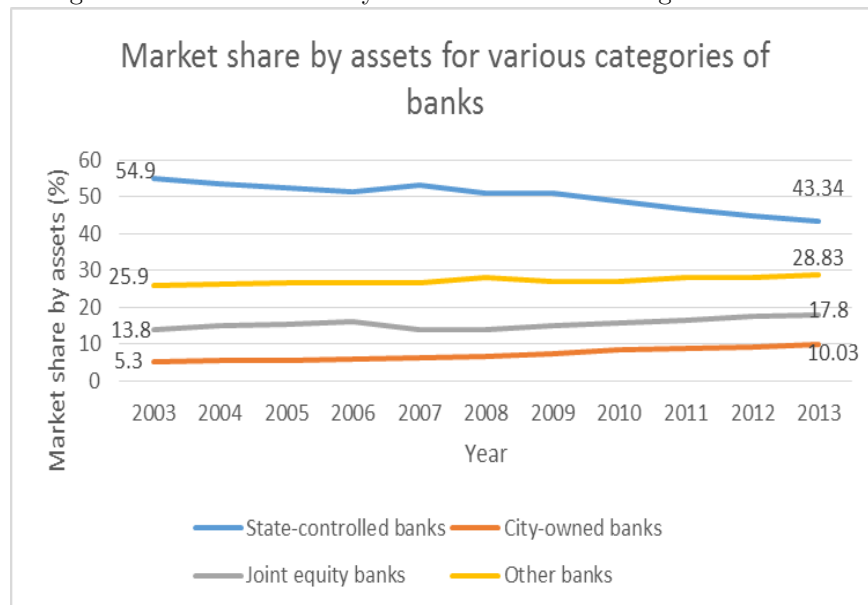


Source: CBRC, PBOC

growth for state-controlled banks accelerated from 13 percent in 2008 to 25 percent in 2009—a sharper surge than for private banks—reflecting the role of state-controlled banks in the stimulus policy. In addition, after 2013, the downward trend is more dramatically for state-controlled banks than average banks, indicating that they were scaling back more swiftly in response to the government’s policy decision to slow down the economy in order to avoid a potential financial sector bubble.

An important recent development in the banking sector is the decrease in the market share of state-controlled banks affiliated with the national government and the corresponding rise in the activities of banks affiliated with city-level governments, as shown in Figure 3.3. For example, the market share measured by assets for city-

Figure 3.3: Market Share by Assets for Various Categories of Banks



Source: CBRC, PBOC

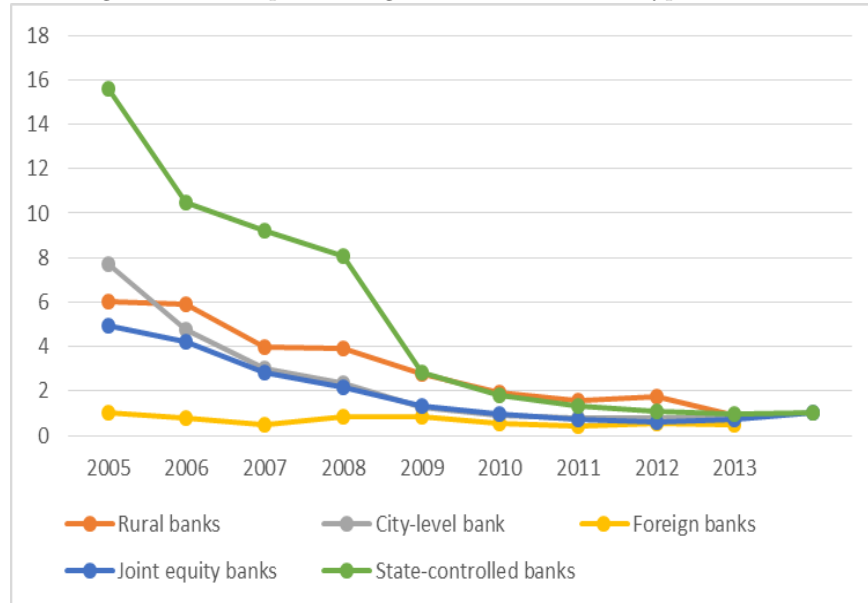
level banks doubled from around 5 percent to 10 percent from 2003 to 2013 while the share of (national) state-controlled banks shrank from around 55 percent to 43 percent. Indeed, other banks expanded more rapidly than the big five state-controlled banks, even while those key firms retain a dominant share of domestic lending. In another words, market concentration remains quite high in the Chinese banking sector, raising the issue of institutions that are “too big to fail.” Since these firms are state-controlled, there is a sense in which it is understood that they would be rescued by the central government if needed. What is not yet clear, however, is whether the supervisory regime and incentives for lending controls are adequate to protect the fiscal balance against recurring bailouts.

The non-performing loan (NPL) rates fell even while China's banking sector expanded dramatically over the past decade (Figure 3.4). Bad loans rates fell for all types of banks, though with the most progress made by the state-controlled banks, where the NPL rate went from around 16 percent in 2003 to less than 2 percent in 2013. Foreign-owned banks remains the lowest in terms of bad loan rates, reflecting both the absence of obligations for them to lend for policy purposes and better risk management, especially in earlier years. While the non-performing loan rate has been low and nearly the same for all types of banks since 2011, we conjecture that this will change as bad assets are recognized in the future. For example, set aside the potential bad loans in real estate and local government that we already know, SOEs are accumulating bad assets quickly in industries with huge supply glut. The Chinese steel industry, mostly controlled by various levels of government, has been suffered a low demand due to the slowdown of real estate investment and over-investment in production capacity after 2008.⁴ We discuss the policy challenges this will bring, below.

The assets of non-bank wealth management companies or trust funds grew more than 50 percent between 2008 and 2012, and have likely continued to increase at an even more rapid rate since then, as shown in Figure 3.5 from the report by McKinsey Consulting (2013). Trust financing has emerged as the second largest

⁴ While the detailed data on supply glut is hardly available, the iron ore price, mainly driven by demand from Chinese steel industry has been down by more than at least 30 percent between 2011 to 2014. For detail information, please refer to: <http://www.indexmundi.com/commodities/?commodity=iron-ore&months=60>

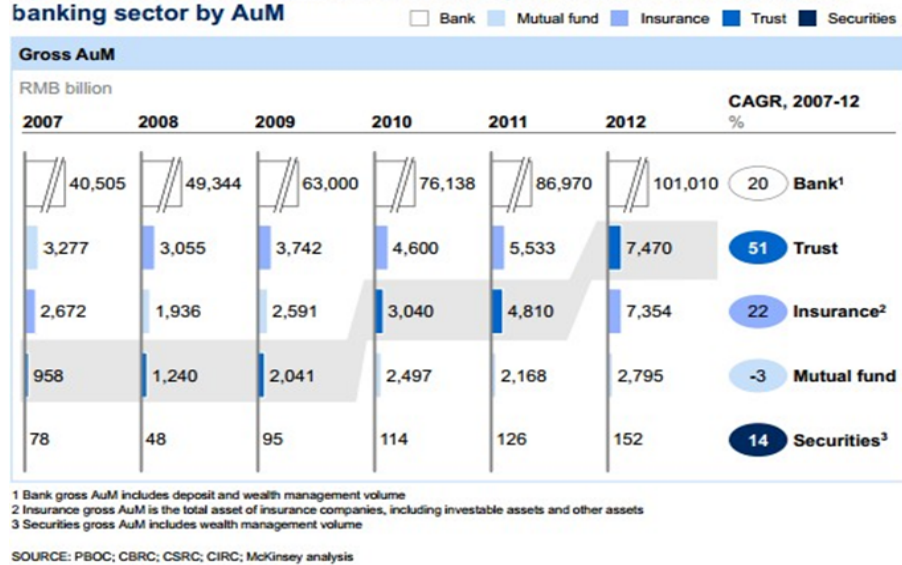
Figure 3.4: Non-performing Loans for Different Types of Banks



Source: CBRC, PBOC

component of total financing, providing enormous amounts of credit to a range of activities, including natural resources companies, infrastructure projects through local-government-controlled investment companies, and especially real estate developers. There are several reasons for the rise of the trust companies. First, financial liberalization introduced by the China Banking Regulation Commission in 2007 allowed the trust firms to finance some types of investors who did not have access to financing through banks and bond markets—local governments in particular. Second, trust companies provide a way for households to diversify their asset holdings. In China, trust companies invest in a wide range of investment products including loans, stocks, and even wines. These are all available to individual investors but trust companies provide convenience and perhaps expertise or economies of scale. Third, and perhaps most ominously for financial stability, is that increased regulation for the

Figure 3.5: The Development of Trust Funds Share in Financial Sector
By 2012, trust has become the second largest financial sector after the banking sector by AuM



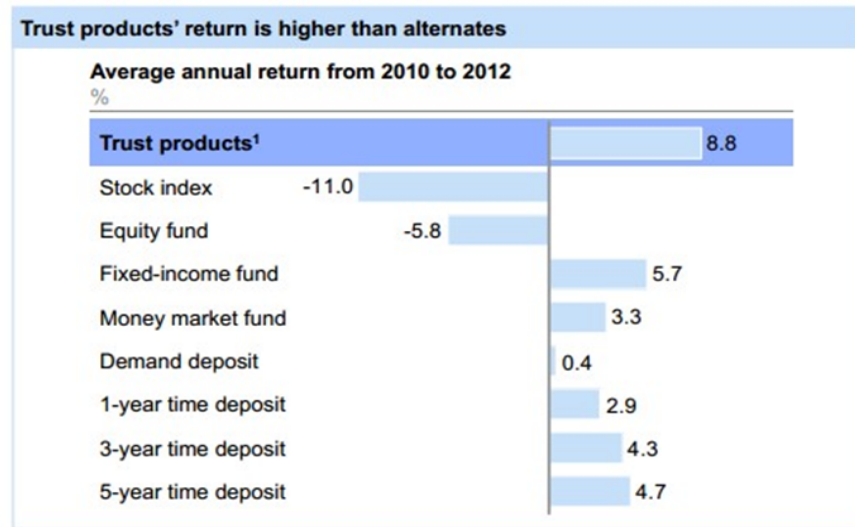
Source: The Coming Transformation of China's Trust Industry: China Trust Industry Report 2013 by McKinsey

formal banking sector including higher required reserve ratios have caused borrowers to shift from banks to non-banks such as investment trusts. This comes about as the higher costs for banks lead them to seek higher profit margin loans, which tend to be safer ones given that lending rates are subject to a cap. An irony is that banks themselves participate in this shift, selling wealth management products on behalf of trust companies in return for a commission. In other words, the shadow banking system grows in the lobby of the banks themselves. Given the close relationship, banks might well feel an obligation to ensure that trust fund investors do not take losses, meaning that the sales of these products by banks constitute the use of off balance sheet activities to evade regulation.

The yield from investing in trust funds is significantly higher than other investment tools (Figure 3.6), providing a considerable incentive for both investors and banks to expand this activity. The growth of trust funds and steady decline in bank assets from 2009 suggests a shift in the composition of Chinese credit generation. It is likely that banks effectively provide an implicit guarantee for the trust products they sell, in part because many purchasers of trust fund products do not understand the precise terms of the investments they are making and thus rely on banks, which in turn are backed by the government. The question for policy is whether the Chinese government will feel obligated to backstop trust funds so that households do not take losses in the event that the underlying loans go bad. Understanding the development of the shadow banking sector in China is thus of paramount policy importance. The rise of such shadow banks has meant that regulatory efforts to restrict bank lending have been only moderately successful, with credit generation shifting to these less-regulated entities.

Another important recent development is the fast growth in internet finance along with burgeoning money market funds (MMF). Internet-based companies take in customer investments (akin to deposits), usually in relatively small amounts from many investors, pool together these customer funds together in a money market fund and then purchase short-term securities such as interbank deposits or commercial paper or bills that earn higher interest rates than bank deposits. The higher yields on the money market investments translate into higher interest rates for money market fund

Figure 3.6: The Comparison of Returns to Different Investment Products



¹ Expected return. Actual realized return of all trust products is difficult to observe as payout information is not publicly disclosed

SOURCE: www.yanglee.com; China Trustee Association; WIND; Bloomberg; McKinsey analysis

Source: The Coming Transformation of China's Trust Industry: China Trust Industry Report 2013 by McKinsey

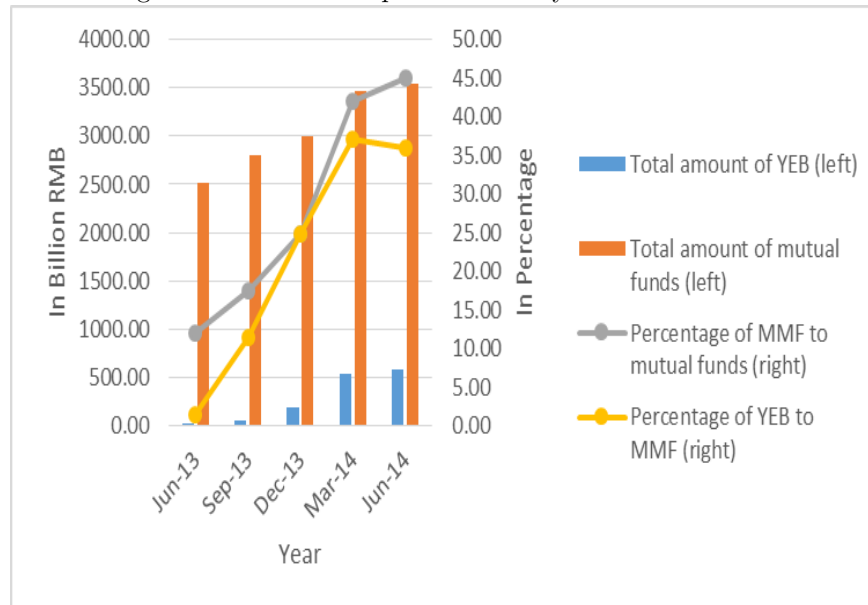
customers. The process is akin to the operation of money market mutual funds in the United States, but distinguished by the ease of making small deposits and using the funds for retail-level purchases—essentially turning the funds into a money-like asset. The lending activity thus involves some maturity and/or risk transformation, but without access to a central bank liquidity facility or an explicit government guarantee on depositors—that is, without the main policies put in place to avoid financial panic. The rise of internet-based funds has greatly facilitated both investing and borrowing from these financial vehicles.

The most significant event for the takeoff of internet finance in China was the launch of the Yu'e bao (YEB) investment platform in late May 2013 by Alibaba, a firm that is in the process of listing on the U.S. New York Stock Exchange (NYSE)

at a market capitalization of more than \$150 billion. Yu'eobao allows individual Chinese investors to easily put small amounts into a savings account, which in turn is linked to other payment facilities within the Alibaba corporate family. Together, this provides banking-like services but outside the more regulated bank framework. Mutual funds are familiar to Chinese investors. The introduction of YEB in the form of internet finance, however, has dramatically changed the landscape of not only money markets but also mutual funds, as seen in Figure 3.7. From June 2013 to June 2014, YEB has grown to 570 billion RMB in assets (roughly \$100 billion), reaching a 35 percent share of total money markets within one year. Moreover, money markets now account for around 45 percent of the total amount of mutual funds, up from only 10 percent—again, all in just one year—as other Internet companies have emulated Alibaba in launching similar money market funds. The entrants include China's dominant search engine Baidu and Tencent, the parent of China's most popular messaging app. Together, the increase in mutual fund investments over the past year mainly comes from internet-based money market funds.

Yu'eobao has been hailed as the “fund for the masses” because it reduces the transaction costs and lowered the entry barriers that used to bar small investors from investing in money market funds with higher yields than bank deposits. Using Zhifubao, a Chinese analogue to Paypal, an individual can invest as little as 0.1 yuan (about 2 U.S. cents) and withdraw anytime through a mobile phone or internet-connected computer. This has significantly changed the operation of traditional mutual funds that retailed through bank branches. The government might be seen

Figure 3.7: The Development MMF by Internet Finance



Source: AMAC, PBOC

as having given implicit permission and even encouragement for internet finance to develop as a means by which to gradually liberalize interest rates, even though in doing so this creates an unequal playing field between money funds and bank deposits.

Chinese savers have long faced financial repression since the central bank maintains a ceiling on deposit rates—indeed, the repression is substantial in that the ceiling is set so low as to entail a negative real rate (that is, adjusting for inflation) even when the return to capital for the overall economy has been estimated to be higher than 20 percent. Both the central government and the PBOC realize the importance of liberalizing interest rates as part of a program to remove distortions in credit markets that affect the allocation of capital and thus the efficiency of saving and investment in the Chinese economy.

Regulatory authorities so far appear to be fine with the new development, with a promise from Premier Li Keqiang “to promote the healthy development of Internet finance.” The greater access to saving vehicles and to lending indeed has the potential to serve an important role in financial sector liberalization. As yet, except for a restriction from the PBOC setting a daily limit on transfers from banks to YEB, these vehicles are scarcely regulated and thus open to runs in principle. The money market could thus serve as the starting point for financial problems, much as was the case with the failure of a money market mutual fund playing a key role in the crisis that ensued in the wake of the failure of Lehman Brothers in the United States. We discuss policy implications further in the following part.

3.4 The challenge and proposal of financial sector reform

While financial liberalization is necessary in China to foster an improved allocation of capital and thus to contribute to sustain growth, the wide experience across countries is that liberalization is often followed by rapid increases in credit and booming asset prices that eventually lead to a bubble which bursts into crisis and recession. This is thus the challenge for Chinese policymakers, to embark on reforms that will allow for development of the financial market and improved stability while not regulating so much as to stifle growth—especially when credit creation has been an key ingredient in growth, especially since 2008. In this section, we identify the future challenges and risks for the Chinese economy.

Financial sector policy in China must contend with both the potential vulnerabil-

ities that could be created by reforms that address ongoing financial sector problems, and with the legacy of past distortions. The combined list of challenges is long, and encompasses both domestic and international aspects, as well as a complex mix of regulatory, monetary, and exchange rate policy. The domestic financial system is at the heart of the policy challenge. Distorted incentives such as the obligation of state-owned banks to lend to affiliated companies has meant that resources are not efficiently allocated within the Chinese economy, while at the same time leaving an overhang of bad debts built up within banks and other financial institutions. But continued shortcomings in the effectiveness of financial sector regulation and supervision mean that simply absorbing the costs of existing bad loans will simply set the stage for yet another bailout. What is needed are measures that both address the bad loans and thus ensure the stability of the financial system, and that give rise to better incentives for quality lending practices—to fix the problem and to prevent a future recurrence. Regulatory reform must also encompass the growing shadow banking system to ensure that bad loans made outside the banking system do not result in liabilities that ultimately receive an official guarantee. This could happen, for example, if banks feel obligated to step in to avoid losses in shadow bank financing channels such as wealth management products. The same might be true of informal credit networks if lending in this sector results in claims on the banking system—that is, if banks or other regulated firms have an obligation, even if implicit, to stand behind informal financial institutions. An especially important concern for policymakers is to ensure that Chinese households do not take unexpected losses, including on deposits in state-affiliated banks that are widely seen as supported by the government. A task for reform is to clearly delineate the extent of Chinese government

guarantees—and to credibly commit to limits on these guarantees. But that is for the future—it will be difficult for China to step away from the implicit guarantees that apply to current household assets. Making good on these guarantees could be costly, especially given the years’ worth of directed lending to state-affiliated enterprises. Fortunately, this provides a purpose for China’s \$4 trillion in reserves—as a source of funding to absorb the costs of the eventual financial sector bailout without the need for increased tax or inflationary measures.

Looming over regulatory reform efforts are China’s continued moves to financial sector deregulation and toward a more market-driven exchange rate and less expansionary monetary policy. These steps ultimately are needed as part of a reform to improve the allocation of resources within the economy through greater scope for private incentives. But the timing is tricky. Monetary policy to support export-oriented growth gives rise to a weak Chinese currency compared to the value that would obtain with monetary policy in the presence of more balanced growth. The corresponding loose monetary conditions in turn fuel domestic inflationary pressures and asset price gains, particularly in the presence of financial sector repression that restricts the range of assets in which households and businesses can invest. With real estate open for investment, but assets such as foreign equities still restricted, it is not surprising that easy liquidity pours into real estate, driving price gains and questionable lending.

A natural antidote would be to open capital flows, in both directions. Inward capital flows would mean foreign competition that pressures Chinese lenders to improve their performance, notably by avoiding money-losing loans to state-affiliated enterprises. Loosening the restrictions on outward capital flows would improve the

return on investment of China's prodigious saving and diminish the upward pressure on domestic assets such as real estate.

But there are risks with opening in both directions. Inward capital flows could set off a new domestic asset bubble, especially if domestic lenders receive capital inflows but are not yet set up to properly invest their new funding. A rapid increase in outward capital flows could burst the Chinese real estate bubble too quickly, spreading losses that imperil domestic institutions and spill over to the real economy. The same worries apply to rapid changes in the stance of China's monetary policy. The current loose monetary stance must change, but recent efforts to slow credit growth have been reversed at indications of an overly rapid slowing of the real economy. China's growth is addicted to both a weak currency and easy money. Both must change, but the withdrawal must be done gradually to sustain economic growth.

As before, China starts from a position of strength in that the trillions of dollars of reserves allow losses to be absorbed while avoiding inflation, and allow the Chinese government to take fiscal action to support the economy. These reserves in a sense represent the distortions of the past, notably the overly weak monetary policy associated with export-led growth. There would be a certain sense of closing a circle for these reserves to be spent down in dealing with the problems that resulted from past Chinese policy decisions.

A key difficulty in moving forward is to identify the needed reforms and their sequencing, and to have the political willingness to put them into place. Moving forward with financial sector reform could be especially difficult when changes might improve the economy as a whole or help to ensure financial sector stability, but could disadvantage particular firms (such as exporters as the RMB appreciates) or segments

within society. Moreover, efforts to improve financial system efficiency could impinge on growth in undesirable ways, including by reducing the availability of credit for companies that now rely on the shadow banking system or other lightly regulated channels. This is not a reason to avoid reform, but a sense of the caution required. This suggests an incremental approach, in line with the decades-long experience of China in opening to the market.

Domestic financial reform encompasses several areas. Interest rate liberalization is a key step in ensuring appropriate incentives for lenders, borrowers, and depositors (who fund bank loans). But this will only be effective if the state backs away from control of lending, including by giving up the practice of directed lending by state-affiliated banks to state-owned enterprises. Banks could still be used as a tool for policy, but with the cost of any directed lending made explicit, including the subsidy cost involved with loans that do not match up to private standards.

Once measures have been taken to improve lending going forward, it is next important to clean out the bad loans from the domestic banks, including recognizing losses and recapitalizing banks as needed. Banks laden with bad loans choke up the financial system, rolling over loans to zombie borrowers so as to avoid recognition of losses, rather than providing credit to borrowers with worthwhile investment projects. Not taking action to clean out the legacy of the past would sacrifice future growth. There will a fiscal cost—perhaps into the trillions of dollars given reports of the estimated size of the bad loans problem in China. But these losses already exist; the policy recommendation is simply to recognize and account for them.

Private capital could further be brought in to fund banks, including the large state lenders. This would be especially useful to ensure that private incentives drive

lending decisions—that is, so long as the private capital is credibly at risk and not protected by an implicit state guarantee. Indeed, a challenge for the government will be to provide a clear indication of the scope of any support. That is, the state could commit not to bail out shareholders, even while making explicit the degree of support for household and even business deposits.

The growth of the shadow banks over the past several years has been effectively part of an implicit liberalization of the financial system, in the sense that shadow banks such as investment trusts have been able to provide loans to firms and activities that do not traditionally qualify for support from state-owned banks, including both private manufacturing firms and even some local government infrastructure activities. The shadow banking system can be seen as dangerous in the sense that it is largely unregulated and might have an effective government guarantee through connections between shadow lenders and banks. But it is also useful as a step toward deregulation of financial market prices (interest rates) and quantities (the recipients of loans). There is a sense in which government authorities have implicitly endorsed the growth of the shadow banks in that they have not cracked down on this activity. The key going forward will be to delimit government support to ensure that there is not an unintended bailout, and to strengthen supervision of activities that do intersect with the regulated (and guaranteed) banking sector. There will be an important role for consumer education to ensure that Chinese households and businesses understand the limits of any government support.

These dimensions of improvement of the domestic financial sector, both formal and informal, are vital to allow for a more rapid move forward with formal liberalization of the capital account. A key concern with capital inflows is over the possibility

of bubble problems as in the Nordic or Asian countries in the 1990's, when the domestic financial system did not have the capacity to properly intermediate inflows of capital.⁵ This led to problems with bad lending, ultimately ending in crises and (especially in the case of Asia), bailouts and recessions.

In moving slowly with capital flow liberalization, China appears to have learned the lessons of countries where things went wrong. But the necessary lessons to draw are not just about how to avoid a bubble and crisis. China would also benefit immensely from moving forward with financial sector reforms that improve the quality of financial intermediation and better support investment and growth. If reform lags in providing domestic competition in financial services, then more aggressive steps toward capital account liberalization would be a way to put competitive pressures on the domestic financial sector. Indeed, not moving forward in capital account liberalization means giving up a lever for productivity growth and improved financial services.

A possible avenue in which reform could be accelerated is exchange rate liberalization. Having taken steps to tighten the capital controls such as cracking down on banks that facilitate illicit capital movements, China might see itself as more able to liberalize exchange rate movements while feeling secure that there would be less impact through the capital account such as with hot money that stokes asset bubbles or capital flight. Allowing even more exchange rate flexibility than the steps taken to date would remove one driving factor behind credit growth and alleviate pressures on both asset prices and broader inflation.

At the same time, it would be useful for China to foster a deeper domestic bond

⁵For more information on the impact of financial liberalization on Nordic financial crisis, please refer to Jonung (2010).

market, both to provide improved financing channels for domestic firms and to facilitate a less unwieldy instrument for monetary policy. With a greater impact of bond prices on lending and thus overall economic activity, Chinese policymakers could rely more on interest rate targeting for monetary policy rather than more blunt credit directives. The use of the directives to banks to open and close their lending spigots as a means for monetary policy control has meant a start-stop element for Chinese macro policy making, with the economy lurching into slowdown and then renewed stimulus with turns of the spigot. This could be addressed by allowing for more smooth changes in the setting of monetary conditions—though this would only work in practice if accompanied by effective channels for changes in interest rates to affect economic activity.

3.5 Conclusions

China faces a delicate balance with financial sector reform. A more effective financial sector ultimately will be a key contributor to continued strong growth. Reform will provide for a better allocation of savings to productive uses, and ensure that non-productive sectors receive a diminishing flow of resources—unless supported by explicit transfers from the government. Without financial sector reform, it will be difficult for China to maintain its strong growth and to avoid the middle income trap experienced by other emerging market countries. Financial sector reform is also an essential element in allowing for a removal of current restrictions on capital flows and for moving toward a market-driven exchange rate. These are both elements that

will contribute to stronger and better balanced growth in China, including through a reallocation of resources from export-oriented firms to ones focused on domestic-led consumption.

China's export-driven growth model has succeeded, but a continuation of it poses threats to inflation and to financial stability. Reform of the financial system is necessary to maintain financial stability, including both to ensure that households have confidence in the availability of their savings, and so that the government is not swamped by recurring massive bailouts.

To paraphrase Deng Xiaoping, China has done well so far in crossing the river of financial reform and liberalization by touching the stones. But the incremental approach involves costs in terms of continued poor resource allocation within China and mounting problems with inflationary pressures, asset bubbles, and bad debts. The difficulty for China will be to move forward with reform quickly enough to avoid instability and support adjustment, but not so rapidly as to disrupt the export-oriented growth model until the financial system and consumption and investment patterns have re-oriented toward domestic-led growth.⁶

⁶Using extensive cross country data, Kaminsky and Schmukler (2008) find that financial liberalization tend to lead to financial crisis and thus economic loss in the short term. However, the long term gain will outweigh short term loss. However, it is hard for us to assess China's case given its complexity and economic scale.

Bibliography

- ACEMOGLU, D., S. JOHNSON, AND J. ROBINSON (2012): “The Colonial Origins of Comparative Development: An Empirical Investigation: Reply,” *The American Economic Review*, 102(6), 3077–3110.
- ALCALÁ, F., AND A. CICCONE (2004): “Trade and productivity,” *The Quarterly Journal of Economics*, 119(2), 612–645.
- ALFARO, L., A. CHARLTON, AND F. KANCZUK (2008): “Plant-size distribution and cross-country income differences,” Discussion paper, National Bureau of Economic Research.
- ALLEN, F., J. QIAN, AND M. QIAN (2005): “Law, Finance, and Economic Growth in China,” *Journal of Financial Economics*, 77(1), 57 – 116.
- ALLEN, F., J. QIAN, C. ZHANG, AND M. ZHAO (2012): “China’s Financial System: Opportunities and Challenges,” Working Paper 17828, National Bureau of Economic Research.
- ANGELETOS, G.-M., AND L.-E. CALVET (2006): “Idiosyncratic production risk, growth and the business cycle,” *Journal of Monetary Economics*, 53(6), 1095–1115.

- ARELLANO, M., AND S. BOND (1991a): “Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations,” *Review of Economic Studies*, 58, 277–297.
- (1991b): “Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations,” *The Review of Economic Studies*, 58(2), 277–297.
- AYYAGARI, M., A. DEMIRGÜÇ-KUNT, AND V. MAKSIMOVIC (2010): “Formal versus Informal Finance: Evidence from China,” *Review of Financial Studies*, 23(8), 3048–3097.
- BANERJEE, A. V., AND E. DUFLO (2005): “Growth theory through the lens of development economics,” *Handbook of economic growth*, 1, 473–552.
- BANERJEE, A. V., AND B. MOLL (2010): “Why does misallocation persist?,” *American Economic Journal: Macroeconomics*, pp. 189–206.
- BANK, W. (1997): “China’s Management of Enterprise Assets,” *World Bank Report*.
- BARTELSMAN, E., J. HALTIWANGER, AND S. SCARPETTA (2013): “Cross-country differences in productivity: The role of allocation and selection,” *The American Economic Review*, 103(1), 305–334.
- BERNARD, A. B., AND J. B. JENSEN (2004): “Why Some Firms Export,” *The Review of Economics and Statistics*, 86(2), 561–569.
- BOND, S. (2002): “Dynamic panel data models: a guide to microdata methods and practice,” CeMMAP working papers CWP09/02, Centre for Microdata Methods and Practice, Institute for Fiscal Studies.

- BRANDT, L., J. VAN BIESEBROECK, AND Y. ZHANG (2012): “Creative accounting or creative destruction? Firm-level productivity growth in Chinese manufacturing,” *Journal of Development Economics*, 97(2), 339–351.
- BROWN, J. R., AND B. C. PETERSEN (2009): “Why has the investment-cash flow sensitivity declined so sharply? Rising R&D and equity market developments,” *Journal of Banking & Finance*, 33(5), 971 – 984.
- COUSIN, V. (2007): *Banking in China*. Palgrave Macmillan.
- CULL, R., AND L. C. XU (2005): “Institutions, Ownership, and Finance: The Determinants of Profit Reinvestment among Chinese Firms,” *Journal of Financial Economics*, 77(1), 117 – 146.
- DEMIRGÜÇ-KUNT, A., AND V. MAKSIMOVIC (1998): “Law, Finance, and Firm Growth,” *The Journal of Finance*, 53(6), 2107–2137.
- DENG, H., J. HALTIWANGER, R. MCGUCKIN, J. XU, Y. LIU, AND Y. LIU (2007): “The Contribution of Restructuring and Reallocation to China’s Productivity and Growth,” *Economics Program Working Papers*, (07-04).
- D’ERASMO, P. N., AND H. J. MOSCOSO BOEDO (2012): “Financial structure, informality and development,” *Journal of Monetary Economics*, 59(3), 286–302.
- DOBSON, W., AND A. K. KASHYAP (2006): “The Contradiction in China’s Gradualist Banking Reforms,” *Brookings Papers on Economic Activity*, 2006(2), 103–162.
- DOLLAR, D., AND S.-J. WEI (2007): “Das (Wasted) Kapital: Firm Ownership and Investment Efficiency in China,” Working Paper 13103, National Bureau of Economic Research.

- EBERLY, J., S. REBELO, AND N. VINCENT (2012): “What explains the lagged-investment effect?,” *Journal of Monetary Economics*, 59(4), 370 – 380.
- FORBES, K. J. (2000): “A Reassessment of the Relationship between Inequality and Growth,” *American Economic Review*, 90(4), 869–887.
- FOSTER, L., J. HALTIWANGER, AND C. SYVERSON (2008): “Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?,” *American Economic Review*, 98(1), 394–425.
- FRANKLIN ALLEN, J. Q., AND M. QIAN (2008): *China’s Financial System: Past, Present, and Future*. Cambridge University Press.
- GILCHRIST, S., AND C. P. HIMMELBERG (1995): “Evidence on the role of cash flow for investment,” *Journal of Monetary Economics*, 36(3), 541 – 572.
- GILCHRIST, S., J. W. SIM, AND E. ZAKRAJSEK (2010): “Uncertainty, Financial Frictions, and Investment Dynamics,” *Working Paper*.
- GOETZMANN, W. N., AND E. KOLL (2005): *A History of Corporate Governance around the World: Family Business Groups to Professional Managers*. University of Chicago Press.
- GUARIGLIA, A., X. LIU, AND L. SONG (2011): “Internal Finance and Growth: Microeconomic Evidence on Chinese Firms,” *Journal of Development Economics*, 96(1), 79 – 94.
- HÉRICOURT, J., AND S. PONCET (2009): “FDI and Credit Constraints: Firm-Level Evidence from China,” *Economic Systems*, 33(1), 1–21.

- HIMMELBERG, C. P., AND B. C. PETERSEN (1994): “R & D and Internal Finance: A Panel Study of Small Firms in High-Tech Industries,” *The Review of Economics and Statistics*, 76(1), pp. 38–51.
- HOSHI, T., A. KASHYAP, AND D. SCHARFSTEIN (1991): “Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups,” *The Quarterly Journal of Economics*, 106(1), pp. 33–60.
- HSIEH, C.-T., AND P. J. KLENOW (2009): “Misallocation and manufacturing TFP in China and India,” *The Quarterly Journal of Economics*.
- JONUNG, L. (2010): “Lessons from the Nordic financial crisis,” in *American Economic Review, Papers & Proceedings*. Citeseer.
- KAMINSKY, G. L., AND S. L. SCHMUKLER (2008): “Short-Run Pain, Long-Run Gain: Financial Liberalization and Stock Market Cycles*,” *Review of Finance*, 12(2), 253–292.
- KIRBY, W. C. (1995): “China Unincorporated: Company Law and Business Enterprise in Twentieth- Century China,” *The Journal of Asian Studies*, 54(1), pp. 43–63.
- KNACK, S., AND P. KEEFER (1995): “Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures,” *Economics & Politics*, 7(3), 207–227.
- LAGOS, R. (2006): “A model of TFP,” *The Review of Economic Studies*, 73(4), 983–1007.

- LEVINE, R. (1997): “Financial Development and Economic Growth: Views and Agenda,” *Journal of Economic Literature*, 35(2), 688–726.
- LEVINE, R., N. LOAYZA, AND T. BECK (2000): “Financial Intermediation and Growth: Causality and Causes,” *Journal of Monetary Economics*, 46(1), 31–77.
- LILEEVA, A., AND D. TREFLER (2007): “Improved access to foreign markets raises plant-level productivity... for some plants,” Discussion paper, National Bureau of Economic Research.
- LIN, J. Y., F. CAI, AND Z. LI (1998): “Competition, policy burdens, and state-owned enterprise reform,” *American Economic Review*, pp. 422–427.
- LU, D. (2012): “Exceptional Exporter Performance? Evidence from Chinese Manufacturing Firms,” *Working Paper*.
- LUCAS JR, R. E. (1978): “On the size distribution of business firms,” *The Bell Journal of Economics*, pp. 508–523.
- MAKSIMOVIC, V., G. PHILLIPS, AND N. R. PRABHALA (2011): “Post-merger restructuring and the boundaries of the firm,” *Journal of Financial Economics*, 102(2), 317–343.
- MAURO, P. (1995): “Corruption and Growth,” *The Quarterly Journal of Economics*, 110(3), 681–712.
- McKINSEY CONSULTING, C. (2013): “The Coming Transformation of China’s Trust Industry: China Trust Industry Report,” .
- MELITZ, M. J. (2003): “The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity,” *Econometrica*, 71(6), 1695–1725.

- MELITZ, M. J., AND S. POLANEC (2012): “Dynamic Olley-Pakes Productivity Decomposition with Entry and Exit,” Working Paper 18182, National Bureau of Economic Research.
- NICKELL, S. (1981): “Biases in Dynamic Models with Fixed Effects,” *Econometrica*, 49(6), pp. 1417–1426.
- OLLEY, G. S., AND A. PAKES (1996): “The Dynamics of Productivity in the Telecommunications Equipment Industry,” *Econometrica*, 64(6), 1263–1297.
- PARK, A., AND K. SEHRT (2001): “Tests of financial intermediation and banking reform in China,” *Journal of Comparative Economics*, 29(4), 608–644.
- PAVCNIK, N. (2002): “Trade liberalization, exit, and productivity improvements: Evidence from Chilean plants,” *The Review of Economic Studies*, 69(1), 245–276.
- PETRIN, A., AND J. LEVINSOHN (2012): “Measuring aggregate productivity growth using plant-level data,” *The RAND Journal of Economics*, 43(4), 705–725.
- PORTA, R. L., F. L. DE SILANES, A. SHLEIFER, AND R. VISHNY (2000): “Investor Protection and Corporate Governance,” *Journal of Financial Economics*, 58(1-2), 3 – 27.
- PORTA, R. L., F. LOPEZ-DE-SILANE, A. SHLEIFER, AND R. W. VISHNY (1996): “Trust in Large Organizations,” Discussion paper, National Bureau of Economic Research.
- PORTA, R. L., F. LOPEZ DE SILANES, A. SHLEIFER, AND R. W. VISHNY (1998): “Law and Finance,” *The Journal of Political Economy*, 106(6), pp. 1113–1155.

- RAJAN, R. G., AND L. ZINGALES (1998): “Financial Dependence and Growth,” *The American Economic Review*, 88(3), pp. 559–586.
- ROSENZWEIG, M. R., AND K. I. WOLPIN (1993): “Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries: Investments in bullocks in India,” *Journal of political economy*, pp. 223–244.
- SONG, Z., K. STORESLETTEN, AND F. ZILIBOTTI (2011): “Growing Like China,” *American Economic Review*, 101(1), 196–233.
- SVENSSON, J. (1998): “Investment, Property Rights and Political Instability: Theory and Evidence,” *European Economic Review*, 42(7), 1317–1341.
- WANG, X., G. FAN, AND H. ZHU (2007): “Marketisation in China, progress and contribution to growth,” *China: Linking Markets for Growth*, pp. 30–44.
- YATSKO, P. (2000): *New Shanghai: The Rocky Rebirth of China’s Legendary City*. Wiley.
- YONGDING, Y. (2007): “Global Imbalances: China’s Perspective,” *Peterson Institute for International Economics*.
- ZHANG, A., Y. ZHANG, AND R. ZHAO (2001): “Impact of ownership and competition on the productivity of Chinese enterprises,” *Journal of Comparative Economics*, 29(2), 327–346.
- ZIA, B. H. (2008): “Export incentives, financial constraints, and the (mis) allocation of credit: micro-level evidence from subsidized export loans,” *Journal of Financial Economics*, 87(2), 498–527.